Telephony

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Keeping the Wheels Greased

By MRS. MAYME WORKMAN

Traffic Supervisor, The Illinois Telephone Association, Springfield, Ill.

SOME LUBRICANTS for keeping the service wheels running smoothly are: Courtesy and tact, mental and physical alertness, cooperation, intellectual honesty and loyalty, knowledge, courage, organized management, initiative and use of one's judgment, understanding and commendation. Address given before Operators' Conference at Iowa telephone convention

MORE THAN ever before in the history of the telephone era, there is a crying need to keep our service wheels greased. A machine will run without grease or oil for a certain period of time, but the wheels will not run smoothly—without friction—and eventually they will cease to turn.

When this happens it is very likely that the machine has become damaged to the extent that it will require a general overhauling. Worn and damaged parts will have to be replaced.

What keeps our service wheels running smoothly? Courtesy, tact, mental and physical alertness, cooperation, intellectual honesty, loyalty, knowledge, courage, organization, judgment, sympathetic understanding and commendation.

Courtesy and Tact

Courtesy is one of the prime factors and a lubricant, which must be used constantly and hand in hand with courtesy, is tact. They are the "best ever" friction eliminators, both in dealing with customers and with employes.

While courtesy and tact go hand in hand, each has a distinctive meaning. This can best be explained by the story of a colored bell-hop of a certain hotel who was teaching another the tricks of the profession and emphasized, among other things, the necessity for courtesy and tact.

"Courtesy and tack, yo' all say. What am de difference ob dem two words?"

"There am consid'able difference, niggah. The other mornin' I opens a door what proves to be a bathroom and in de tub was a lady. I shut dat door instantaneous and then said: ''Scuse me, sah!' Now ''scuse me' was courtesy, but includen that 'sah,' that was tack."

Chief operators, supervisors and operators have many occasions to use both courtesy and tact. Chief operators and supervisors should be courteous and tactful, not only in dealing with customers but also in their relations with operators if they wish to keep the service wheels running smoothly. This will also tend to create a desire on the part of the operator to do her best.

Operators should also be courteous and tactful in dealing with other operators, both in their own office and in contacting operators in distant offices.

Chief operators and supervisors should be particularly courteous and tactful in handling service criticisms. The proper handling of service complaints is especially important in creating a favorable impression on telephone users.

Mental and Physical Alertness

Mental and physical alertness are valuable aids in keeping our service wheels functioning. Mental alertness is a human awakeness, persistent aliveness, appropriate responsiveness. Each individual is an intelligent organism and during our waking moments we ought to be reacting vigorously and purposely to our whole continuous environment.

By being mentally and physically alert we mean that an operator should sit erect in her chair, her mind and body intent upon the work at hand. We should not permit our thoughts to stray to other things and be mentally asleep on the job.

Cooperation—"One For All and All For One"

Cooperation is the shoulder-to-shoulder idea of individuals which

puts the punch into any enterprise—the "one for all and all for one" spirit. There is nothing in business that equals the importance of employes getting together and staying together.

We can all help to keep those service wheels greased by more willingness to cooperate. Individuals are the instruments of big business, each peculiarly fitted for the most exacting work, and all work in harmony. Worlds, planets, keep their course; they cooperate. Atoms cooperate and make worlds.

The Art of Living says: "No man can stand alone. Cooperation is the keynote of successful business, winning play and a highway to wealth and happiness. He who tries to go alone is like the man with one leg—he makes a succession of jumps and not much progress.

"We are made for cooperation. Humanity is built to the rule of two—two feet, two hands, two eye-lids; two rows of upper and lower teeth. To learn the art of cooperation is to win the game, succeed in business and find happy friendships."

Intellectual Honesty and Loyalty

Intellectual honesty is the faculty of discerning and the courage to correct errors of personal judgment, and frankness in acknowledging the just criticisms of others. If it is necessary for a supervisor to correct you, do not take the attitude that she is always "picking" on you but be honest with yourself and accept the criticism and profit thereby.

Loyalty is that quality of work which enables a man or woman to do the kind of work which counts. Loyalty is deference to discipline, devotion to organization, allegiance to associates. We can condone lack of understanding or ability, excuse lack of enthusiasm or ambition, tolerate lack of initiative, but lack of loyalty is the unpardonable sin.

When we speak of loyalty we do not mean mere loyalty to the telephone company but loyalty to the public as well. The operator, by the very nature of telephone service, is really working for the public.

Never be guilty of making a disparaging remark regarding your company or listen-in or repeat a telephone conversation. Be true to yourself, your public and your company. You have chosen to be a telephone operator. Respect your vocation, uphold it and claim for it the respect it deserves and at all times live up to the ethics of your profession.

Knowledge Is Essential

Knowledge of the work is essential in serving your customers pleasingly and intelligently. Take advantage of every opportunity to add to your fund of knowledge. This will aid you in improving the service and will make your work a real pleasure.

You who are here today have come for that purpose—to add to your fund of knowledge. Are you going to profit by this opportunity? Will you take this knowledge back to your respective offices and put it into practice? Will you pass it on to the operators who did not have an opportunity to attend this conference? If you fail to do this, the knowledge you have acquired will be of little or no value.

Courage Needed to Face Problems

Courage is necessary in facing the many problems which come up in every central office from day to day. It is these problems that add interest and zest to our work. When new ideas are introduced, do you accept them and try them, or do you shy away from them?

It has been said that the biggest coward in the world is the man or woman who is afraid of a new idea. It has also been said that anyone who stops learning is old, whether this happens at 20 or 80. Anyone who keeps on learning not only remains young, but constantly becomes more valuable.

Sometimes we are inclined to think that this or that problem is insurmountable or we worry about imaginary problems. When we get into this frame of mind we should remember that worry has a tendency to shorten life and, after all, most of the things we worry about really never happen.

The Public Service, at Washington, D. C., issued a bulletin against worrying which reads:

"So far as is known, no bird ever tried to build more nests than its neighbor. No fox fretted because he had only one hole in which to hide. No squirrel ever died of anxiety lest he should not lay by enough nuts for two winters instead of one, and no dog lost any sleep over the fact that he did not have enough bones laid aside for his declining years."

So shelve your worries, face your day-to-day problems with a smile and remember that only the game fish swims up stream.

Organization Essential to Efficiency

Whenever a group of individuals are occupied in doing a single piece of work, within the same physical surroundings, there is need for management to produce orderliness and efficiency of production. This is particularly true in the telephone business since the job of giving telephone service is divided between various departments, and in the central office between various groups of operators.

The organization of management is the coordination of all of the activities required under the various duties of management for the purpose of production. Its aim is to bring individuals into systematic cooperation as a whole so that there may be joint action without conflict, with the entire group of employes working toward the accomplishment of a common end.

Production in the central office is the completion of telephone connections or calls. The common end to which the entire traffic organization is working is the accurate, speedy, courteous, and otherwise satisfactory handling of these calls.

Orderliness and efficiency can be secured in meeting these objectives only when the work of the various operating groups is fully coordinated and when the employes in these groups recognize that they can obtain the full measure of opportunity and reward through cooperation.

In a properly organized office the chief operator will see:

1. That she has adequate facilities properly arranged and assigned, and maintained in good working order.

2. That operators are provided when and where required. That the hours of each operator will be scheduled, based upon her peg count. She will have a flexible force; her experienced operators will be properly distributed. She will supervise the training and development of her operators.

3. That the proper morale is maintained at all times. She will keep her operators interested in their work. She will have a daily planned program and see that it is carried out insofar as is possible. She will summarize, review and analyze the service results, developing such procedures as are necessary for the revision of plans and for corrective action when required. Organization is a vital part in keeping our service wheels greased.

Use of One's Judgment

While we have standard phrases and rules covering the most frequently-encountered conditions in the work of serving our customers, occasionally it is necessary to use our judgment in handling a specific call. This is particularly true in advancing a toll call. Some conditions require fast thinking, which reminds me of the student who was being trained in toll work.

Her instructor asked: "If her subscriber placed an 'emergency' call,

what would you do?" The student replied, "I'd write 'emergency' in the 'special instruction' space just as hard and fast as I could. Then I'd signal the supervisor and get her all excited."

If a prescribed phrase does not fit a certain condition experienced in the completion of a call, use your own words in obtaining the necessary information and be sure to ask the necessary questions. Failure to do so may result in a cancelled call.

Occasionally we find an operator who is over-zealous in this respect, particularly in cases where a customer definitely cancels a call. In this case we should accept the cancellation without question, adding, for example: "I am sorry we were unable to reach Mr. Wilson for you."

In our zeal to complete toll calls, we have been termed "haystack searchers," "mounted police," "Sherlock Holmes," and what not. The following incident illustrates why we have merited these appellations:

A customer placed a call for the "coroner" or "man in charge at the morgue" at a certain court house in a distant city. When the operator reached the court house the switchboard operator said: "He isn't here." The operator said: "We'll talk to anybody there." The switchboard operator replied: "There is only one man at the morgue, and—" The operator interrupted: "We'll talk to him." "He's dead," finished the switchboard operator.

With a gasp the operator gave up.

Understanding and Commendation

People in a supervisory capacity should have a sympathetic understanding, the ability of appreciating the point of view of others, to place themselves in an operator's position.

Machines require different kinds of lubricants—hard grease, medium, light and heavy oil, and some parts require a very special kind of particularly fine lubricant to keep the machine running without friction.

One of the finest lubricants in our service wheel is "commendation," for it does so much to keep our service wheels running smoothly. It is sad, but none the less true, that this is usually the rarest lubricant used. Too often we are inclined to be niggardly when it comes to passing out a word of kindness, praise or encouragement. We often hear operators say: "They are always ready to tell us about our faults and shortcomings but they never mention the good things we do."

What a pity, for commendation works wonders. Roger Wood says: "When you hear a kindly phrase, pass it on." If you hear a person complimented, why don't you find an opportunity to tell him about it? This world needs more pleasant reports and fewer biting criticisms.

If you want to be popular, remember the nice things which one person says of another and then tell them. It is such a little thing to repeat compliments. No matter how big or important the man or woman, a genuine compliment gives pleasure. You like to hear pleasant things about yourself. When you don't you feel that what you do is "not much," and that you are given little credit.

Be generous with your commendation. If it is necessary for a supervisor or chief operator to talk to an operator regarding irregularities in her work, try to remember or select some operating feature in which this particular operator excels and, in your conversation, bring this service feature to her attention before discussing the irregularities in her work.

If a chief operator or supervisor receives a commendation for a telephone customer, post the commendation on your bulletin board, giving credit to the operator or operators who handled the call, the name of the supervisor receiving the commendation, the date and time received and the customer's telephone number.

If the chief operator follows this practice, she will be repaid by renewed zeal on the part of the operator receiving the commendation as well as increased interest on the part of her entire force.

In conclusion, let's all put our shoulders to the wheel and let each one do her part in keeping the wheels of service running smoothly, without friction. Our reward will be good customer relations, increased revenue, satisfied management and increased happiness and satisfaction in the knowledge of a task well done.

THINK

By ANNE BARNES

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

We sometimes wonder whether the younger generation has a serious thought. Young folks seem to be frenziedly pleasure-bent. Time, empty of entertainment for even a short while, hangs heavy over their spirits.

When asked what he liked best about school a lad replied, "Recess." If "All work and no play make Jack a dull boy," the reverse should affect Jack in the same way. The better way would be to take time out for pleasure rather than time out for thinking about the serious business of living.

Our mind is our kingdom. Lowell speaks of "Stern men with empires in their brains." One can be sure that such men never found time hanging heavy over their spirits because their minds were filled with empire-building thoughts.

But it is not only the folks who entertain empire-building thoughts who accomplish great things for humanity. I am thinking of a man who put a thought into circulation about equipping lead pencils with rubber tips. That thought helps millions of us daily, besides furnishing him an income of many thousands of dollars per year. That is a thought you or I might have entertained, but we didn't.

I have often wondered about the man who invented roller skates. What first made him think of roller skates? It wasn't a lazy man's idea about getting places fast without lifting the feet. Roller skating has proved to be a great blessing to children, and the idea made its inventor a million dollars richer. Thinking, put that man on "easy street"—where you and I want to be.

Instead of just getting angry at pestering flies and mosquitoes that annoyed him whenever he sat out in the open, a man entertained a "swatter" thought which later made him wealthy and you and me more comfortable. He *thought* so hard about getting the little pests that one day he grabbed a piece of screen wire, made a quick pass and the wary fly was no more.

"Why did the screen swatter work better than a paper," the man wondered? But after he had laid low one fly after another, he knew. The screen wire didn't change the air circulation when descending on Mr. Fly. So, lo and behold, the screen fly swatter became a household necessity.

MORAL: "Those who think must govern those who toil."

Telephone Transmission Theory

By ARTHUR L. ALBERT
Associate Professor of Communication Engineering, Oregon State College

ARTICLE NO. 11, Part II, in series on fundamental principles of electricity for the telephone worker. Power transfer in telephone transmission, and impedance transformers, and the methods of making telephone transmission calculations and measurements, are discussed in this article

THE PROBLEMS of telephone transmission are rather intricate. The telephone circuits must transmit, without undue distortion, the weak speech and program currents, and these cover a rather wide frequency range. Difficult though these problems may be, they are, nevertheless, fascinating to those who desire activities which offer a distinct challenge to their abilities.

In the preceding article an explanation was made of the manner in which electrical energy was transmitted along a telephone line. It was also shown how the transmission could be improved by inductively loading the circuits. Certain additional problems of telephone transmission, and especially the methods of making transmission calculations will be explained in this article.

Power Transfer: In a commercial power system, the *efficiency* of transmission is of great importance. But such systems operate at a constant voltage—such as an a-c voltage of 110 volts—and the power taken is determined by the needs of the customer.

In telephone transmission, the voltage is not constant. The subscriber uses the telephone set as he wishes. The output is not under the control of the telephone company. The company's problem is to get the maximum possible amount of electrical energy out of the telephone set and into the receiving instrument of the distant listener.

It can be shown that when a load, such as a resistor, is connected to a source of voltage, such as a storage battery or a generator, the *maximum* possible power is transferred from the source to the load, *when the resistance of the load is equal to the internal resistance of the source.*

Now it is apparent that if the resistance of the load equals that of the source, then just as much power will be lost inside the source as will be transmitted to the load. That is, the I^2R_S loss in the source equals the I^2R_L power transmitted to the resistor, because they are in series, and the current is the same in each. Thus, the efficiency is 50 per cent for the condition of maximum power output from a source to a load.

Impedance Matching Transformers: The preceding section explained how maximum d-c power transfer resulted when the resistance of the load equalled the internal resistance of the source. The same general principle holds in a-c circuits. The maximum power is taken (or transferred) from a source to a load when the *resistances are equal* and

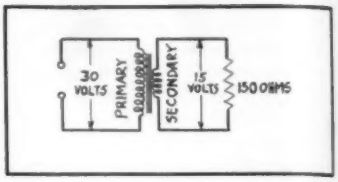


Fig. 1. A Circuit Containing a 2:1 Ratio Transformer "Steps Up" the 150 Ohms Until It Appears to Be 600 Ohms on the Primary Side.

when the *reactances are equal and opposite.*

Thus, if the reactances of a generator and a load are equal and opposite, then the current flow will not be influenced by these reactances since they cancel each other. The resistances of the source and of the load will then be the controlling factors, and the maximum power transfer will occur when these are equal.

This condition of matched resistances and equal and opposite reactances is one which is an exception rather than a common occurrence. Usually the resistance and the reactance of a load are fixed by factors other than power transmission. Although no attempt will be made to

(*Continued on page* 15)

Answers to Problems in Eleventh Article, "Telephone Transmission Theory," Part I

The answers to problems, concerning principles of electricity, given in the eleventh article, part I, of this series entitled "Telephone Transmission Theory"—published in TELEPHONY of July 27—are as follows:

32. 180 miles, 90 miles, 45 miles.
33. 3000 miles.
34. 612 ohms, 5°21′.
35. 0.001265 ampere. Current leads by 5°21′.
36. 463 ohms, 42°43′.
37. 0.001672 ampere. Current leads by 42°43′.
38. 1662 ohms, 2°45′.
39. 0.000467 ampere. Current leads by 2°45′.

NOTE: It may appear that the power entering a loaded cable is less than that for a non-loaded cable. Attention is called to the facts that for the non-loaded cable, the current is about 45° ahead of the voltage, and that the power is *much less* than it appears. Also, in an actual case, a higher voltage would be impressed across the loaded circuit, because a higher ratio transformer would be necessary to match the higher impedance of the loaded line.

(*Continued from page* 10)

give a rigid proof, if the *magnitude* of the impedance of a *load* can be made equal to the *magnitude* of the impedance of the *source*, maximum power transfer will result.

This principle has extensive prac-

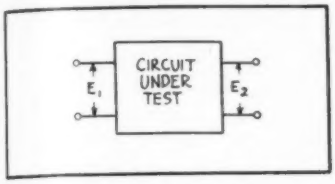


Fig. 2. Simplified Circuit to Illustrate the Computation of Loss or Gains in Decibels.

tical application where the resistance and reactance are fixed. For example, the characteristic impedance of an open-wire line and of a cable circuit are different, and from a practical standpoint, they are fixed.

If they are connected together, they will not properly terminate each other, and a reflection of energy will occur at the termination, thereby preventing the maximum power transfer to the receiving load (and also causing distortion). If, however, the two lines are connected together through a transformer having the proper turns ratio, this reflection will be prevented.

Transformers having more turns in one coil than in the other may be used to match circuits and apparatus and thus prevent reflection loss. Maximum power transfer is obtained because a transformer "steps up" (or down) the impedance. This will be illustrated, for simplicity, with a resistance load. Also, a perfect transformer having no losses, and in which the voltage ratio and the turns ratio are equal, will be assumed.

Suppose that in Fig. 1 $R = 150$ ohms, and that the voltage across the secondary is $E_S = 15$ volts; then, $I_S = 15/150 = 0.1$ ampere. The primary voltage will be $E_P = 2E_S$ because there are *twice* as many primary turns; they are on the *same* core, and hence are cut by the same number of lines of force. Now, the power in the primary must be equal to that in the secondary, because a transformer having no losses was assumed. If this is true, then if the voltage is twice, the current must be half. Thus, $I_P = 0.1/2 = 0.05$ amp.

Now, a (*perfect*) transformer does not change the angle between the current and voltage on the primary and secondary. That is, if a resistor is connected to the secondary, it will appear as a resistor on the primary side. The resistance of the secondary load is $E_S/I_S = 150$ ohms; similarly, the resistance at the primary is $R_P = E_P/I_P = 30/0.05 = 600$ ohms.

Thus, the 2:1 ratio transformer makes a 150-ohm resistor appear to be a 600-ohm resistor. But, 600/150 = 4, and the ratio of transformer turns is 2:1. From this it may be concluded that the impedance measured across the primary of a transformer equals the turns ratio squared times the impedance of the load across the secondary, or

$$Z_P = (N_P/N_S)^2 Z_S \qquad (1)$$

A word of warning should here be given, because mistakes are often made in "matching" circuits with transformers. The transformers must be made for operation across the circuit in which they are to be used. That is, a 2:1 ratio transformer to be used in circuits of low characteristic impedance would not work well for 2:1 ratio transformers in circuits of high characteristic impedance.

The Decibel: The decibel is a unit widely used in telephone work and in other branches of the communication field. As originally defined, a decibel is a power ratio, but is also used in expressing current, voltage, and other ratios as well. If the power input to a device is P_1, and the output is P_2, then N, the number of decibels loss (or gain) is given by the relation

$$N = 10 \log_{10}(P_1/P_2) \qquad (2)$$

The reader may not be familiar with logarithms and their use as in equation (2). This need not prove a handicap, however, because the relations used can be plotted as curves.

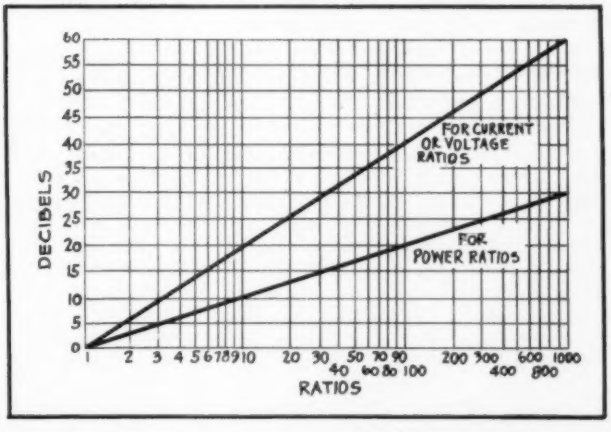


Fig. 3. Curves for Finding Loss or Gains in Decibels.

The relations of equation (2) can also be expressed as follows:

$$P_1/P_2 = 10^{0.1 \times N} \qquad (3)$$

In this expression, N is the number of decibels as in equation (2).

Power values are used in equation (2) and (3), but it is difficult to measure power directly in communication circuits. It is not, however, very difficult to measure voltage and current. Thus, if these two equations can be written in terms of voltage, E, and current, I, the power loss (or gain) can be computed from these more easily-measured values.

Referring to Fig. 2, in terms of the input voltage, E_1, the input power, P_1, can be expressed as $P_1 = E_1 I_1 \cos \theta_1$, and since $I_1 = E_1/Z_1$, $P_1 = E_1^2/Z_1 \cos \theta_1$. Similarly, $P_2 = E_2 I_2 \cos \theta_2 = E_2^2/Z_2 \cos \theta_2$. Substituting these two expressions in equation (2) gives:

$$N = 10 \log_{10} \frac{E_1^2 Z_2 \cos \theta_1}{E_2^2 Z_1 \cos \theta_2}$$

$$= 20 \log_{10} \frac{E_1}{E_2} + 10 \log_{10} \frac{Z_2}{Z_1} + 10 \log_{10} \frac{\cos \theta_1}{\cos \theta_2} \qquad (4)$$

Power can also be expressed in terms of current as $P = I^2R$. Thus, equation (2) becomes

$$N = 10 \log_{10} \frac{I_1^2 R_1}{I_2^2 R_2}$$

$$= 20 \log_{10} \frac{I_1}{I_2} + 10 \log_{10} \frac{R_1}{R_2} \qquad (5)$$

The reader may not be acquainted with the steps involved in obtaining equations (4) and (5), but these very important expressions can be easily explained as follows:

The decibel was originally worked out and applied in the telephone industry where most equipment is designed to work out of, and into, matched circuits of about 600 ohms impedance. The decibel was, however, adopted by others and used for expressing loss and gain in circuits which were not thus matched. Now, if the input resistance and the load resistance are the same, then R_1, R_2; Z_1, Z_2; and $\cos \theta_1$, $\cos \theta_2$ are all the same, and in such matched circuits, equations (4) and (5) become

$$N = 20 \log_{10} E_1/E_2 \text{ or}$$

$$N = 20 \log_{10} I_1/I_2 \qquad (6)$$

That is, in matched circuits (and

only in these) can the power gain or loss in decibels be determined from the simple relations of equation (6).

Transmission Calculations: The equations just discussed have been plotted in Fig. 3 to simplify calculations. The application of this figure

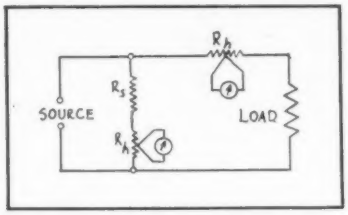


Fig. 4. Connections of Thermocouples for Measuring Voltage or Current.

to actual problems will now be considered.

A certain 300-mile open-wire line has a loss of 0.03 db per mile of line. If 0.001 watt of power is impressed on this line at the sending end, how much power will be received at the distant end? The total loss in decibels will be $0.03 \times 300 = 9$ db. From Fig. 3 this corresponds to a power ratio of about 8.0. Hence, $P_1/P_2 = 8$, and if $P_1 = 0.001$ watt, $P_2 = 0.000125$ watt. Of course, this assumes matched impedances, which is approximately true in most telephone work.

Suppose that it is desired to compute the voltage and currents involved. The characteristic impedance of this circuit is 610 ohms resistance and 57 ohms capacitive reactance. For an approximate solution, the input impedance may be assumed to be 610 ohms resistance. Then, at the power input of 0.001 watt, the voltage impressed (since $P = E^2/R$) will be $\sqrt{0.001 \times 610} = 0.78$ volt.

The input current (since $P = I^2R$) would be $\sqrt{0.001/610} = 0.00128$ ampere. From Fig. 3 the ratios of currents and voltages would be about 2.8. Hence, the voltage at the distant end would be $0.78/2.8 = 0.279$ volt, and the received current would be $0.00128/2.8 = 0.000457$ ampere. This decrease is due to the attenuation of the line.

The product of the current and voltage at the distant end of the line is $0.000457 \times 0.279 = 0.0001265$ watt, and this approximately checks the 0.000125 watt computed in a preceding paragraph. It should be again pointed out that these calculations are *only approximate*, and that they neglect the *reactance* of the line and load, which must be considered for the correct results.

Measurements with Thermocouples: The measurements of d-c values were considered in an early article of this series, and it was shown that simple instruments could be used. Although simple a-c instruments are available for use at 60 cycles in power work, these would be useless in telephone circuits for at least two reasons:

First, telephone speech currents vary in frequency from about 250 to 2750 cycles; and *second*, the power level is so low (that is, the currents are so weak) that there is not sufficient power in the circuit to operate ordinary a-c instruments.

Thermocouples are extensively used for measurements in telephone circuits. The connections are as shown in Fig. 4. The thermo-element consists of two dissimilar metals welded together. They are usually welded to a heater resistor, but in some types they are not in *electrical* contact with this resistor.

The alternating current to be measured passes through the heater and raises its temperature due to I^2R losses. This heats the thermocouple, causing a difference of potential or voltage to be produced between the ends of the metal across which a sensitive d-c galvanometer is connected. This voltage sends a current through the galvanometer, and this current causes the galvanometer to deflect.

Since an a-c value and a d-c value produce the same heating effect, the thermocouple and galvanometer can be calibrated by connecting the heater in series with a battery, d-c milliammeter, and a rheostat, and by observing the deflection for different direct currents. A calibration curve can be plotted from these data.

The thermocouple heater has considerable resistance; in one type extensively used it is 1000 ohms. Obviously, placing such a thermocouple in a circuit may greatly change electrical conditions in that circuit, so care must be used in making measurements with thermocouples.

To measure current, the thermocouple heater is placed in series as shown in the upper wire of Fig. 4. The deflection is read, and the actual current found by reference to a calibration curve. To measure voltage, the thermocouple heater, R_h, is connected in series with a high resistance, R, to limit the current flow, and this combination is connected *across* the line. Since $E = IR$, the voltage across the circuit is $E = I(R + R_h)$. The current, I, is obtained from the galvanometer deflection.

A sensitive thermocouple will not stand a heavy overload, and great care must be employed to prevent burning it out.

Copper-Oxide Instruments: The copper-oxide type of instrument has only been available for a few years but it is widely used, especially where a simple and rugged device is desired, and where an extremely high degree of accuracy is not necessary. A diagram of the usual method of connection is shown in Fig. 5.

Suppose that at a given instant the polarities of the a-c voltage are as shown. Current will then flow as indicated by the arrows. When the voltage reverses during the next half of the cycle, current will flow in a similar manner through the other two rectifier elements. The circuit functions as a full-wave rectifier, and the current will be *down* through the d-c instrument at all times.

The circuit in Fig. 5 is essentially an a-c milliammeter and could be connected directly into the line to measure current. If a high resistance is connected in series with this bridge combination, an a-c voltmeter results. This latter is a particularly useful instrument and has excellent characteristics.

The Impedance Bridge: This device is widely used for measuring the constants of resistors, coils, and condensers, and also for measurements on open-wire lines, cable circuits, and communication equipment such as telephone sets, etc. In general, there are two forms of this bridge; one employs a standard inductance and the other a standard condenser for balancing.

A circuit using a standard inductance is shown in Fig. 6. Suppose that it is desired to find the resistance, R_x, and the inductance, L_x, of the unknown coil. If R_1 equals R_2, then the bridge will be balanced when the setting of the standard inductance, L, equals the inductance, L_x, of the unknown coil, and when the setting of the standard resistor, R,

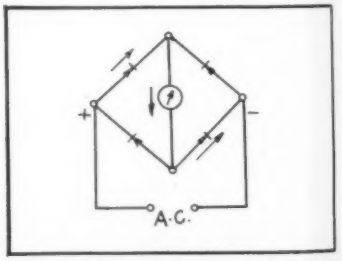


Fig. 5. Full-Wave Rectifier Circuit for Copper-Oxide Rectifier Instruments.

equals the effective resistance, R_x, of the unknown coil.

The fixed resistor, r, balances the resistance of the standard inductance, L, so that the setting of the standard resistance, R, is the correct value of R_x. When the bridge is balanced, no tone (or a minimum tone)

is heard in the headset connected across the bridge.

A standard inductance can also be used to measure the value of an unknown condenser. To do this, the circuit of Fig. 6 would be modified so that the positions of the standard inductance and the resistor, r, would be interchanged. The unknown condenser would be connected where the unknown coil is shown.

With this arrangement, the standard inductance and the unknown condenser are *in series*, and hence at some frequency they will be *in resonance*. The value of the inductance is changed until this resonance point is found. The standard resistor, R, must also be varied to balance the *effective resistance* of the condenser (or capacitive circuit under test). When a minimum tone is heard, the inductance reactance and capacitive reactance are equal, and thus

$$2\pi fL = 1/(2\pi fC), \text{ and}$$
$$C = 1/(2\pi f^2 L) \qquad (7)$$

If a standard condenser is available, it can be used instead of a standard inductance to measure the self-inductance of a coil as shown in Fig. 7. The values, L_x and R_x, represent the unknown coil, and C is the standard condenser. The resistance, R, and the condenser, C, are varied until a minimum tone is heard in the receivers. If R_1 and R_2 are equal, this will occur when R equals the effective resistance of the unknown coil, and the capacitive reactance of the condenser equals the inductive reactance of the coil, and thus

$$1/(2\pi fC) = 2\pi fL, \text{ and}$$
$$L = 1/(2\pi f)^2 C \qquad (8)$$

To use the bridge of Fig. 7 to measure the capacitance of an unknown condenser, this condenser is connected in place of the unknown coil, and the standard condenser is placed in series with the variable re-

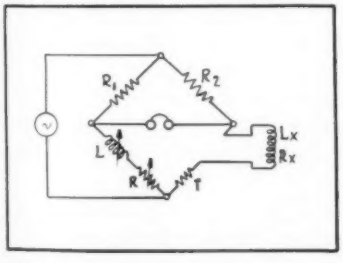


Fig. 6. Impedance Bridge Circuit Using a Standard Inductance.

sistor, R. Then, when the balance is obtained, the capacitance of the condenser under test equals the setting of the standard condenser, and the effective series resistance (which balances the losses) of the condenser equals the setting of R. With a good condenser, this should be very low and is usually negligible.

The mutual inductance of two coils can be determined with an impedance bridge, the circuit of Fig. 6 being well adapted for this purpose. Now, mutual inductance exists between *two* coils, and there are, therefore, *four* terminals brought out.

If these two coils are connected to the bridge in *series*, there are *two* possible combinations: The *first* is to connect them in series so that the lines of force from each coil *add;* and the second is to connect them together so that the lines of force from each coil *oppose* those from the other. With the first connection, the two coils in series will have a high flux per unit current and a high equivalent self-inductance; with the second, the equivalent self-inductance will be low.

The word "equivalent" is used because in the first case the measured inductance is $L_1 = 2M + L_1 + L_2$; and in the second, it is $L_2 = -2M + L_1 + L_2$. That is, for the first connection the lines of force from each coil link the other and produce an inductive effect of twice the mutual inductance or $2M$. In the second instance the lines of force oppose and produce an effect of $-2M$.

If the expression for L_2 is subtracted from L_1, the result is

$$L_1 - L_2 = 4M \qquad (9)$$

Thus, to find the mutual inductance of two coils, connect them to a bridge and measure their equivalent self-inductance when the coils are adding and when they are opposing. *One-fourth* the difference between these two values is the mutual inductance, M.

Summary: Obtaining the maximum possible power output from a device, such as a transmitter, and transferring this into a circuit, such as a telephone line, is very important in telephone work. This is accomplished when the units are properly matched. Transformers are very useful for matching impedances.

The decibel is widely used for measuring transmission losses or gains in telephone work. Although the decibel is defined by a power ratio, the number of decibels can be determined from voltage or current readings. A correction—often neglected—is necessary if the circuits are not properly matched.

Thermocouples are widely used for measuring voltages and currents in telephone circuits. They have the disadvantage of taking appreciable power from the circuit, and this fact sometimes limits their application.

Copper-oxide instruments are quite rugged, reasonably accurate, and are well-adapted for use in telephone systems.

Either a standard inductance or a standard condenser may be used in impedance bridges to measure unknown coils or condensers. They may also be used to measure the im-

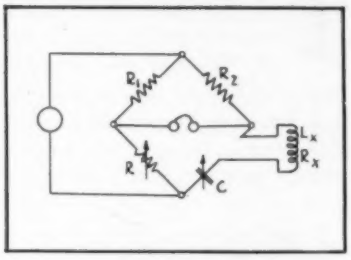


Fig. 7. Impedance Bridge Circuit Using a Standard Condenser.

pedance characteristics of lines, and of telephone apparatus.

Problems:

40. The output impedance of a vacuum-tube oscillator is 600 ohms resistance, the reactance being neglible. Three resistors of 300 ohms, 600 ohms and 1000 ohms are available. Prove that the maximum power is transferred to the 600-ohm resistor when each is connected separately. Assume the open-circuit voltage of the oscillator to be 10 volts.
41. Assume that the resistance of a telephone transmitter is 60 ohms. How should it be connected to a 600-ohm line for maximum power transfer?
42. A 104 mil, non-pole pair side circuit of 12-inch spacing has a loss of 0.066 decibel per mile of line. Calculate the loss in decibels for a 270-mile line.
43. Assuming the characteristic impedance of the line in problem 42 to be 700 ohms resistance, calculate the voltage across the line and the current entering the line if 0.001 watt of power is used in a transmission test.
44. Calculate the voltage and current at the distant end of the line.
45. An impedance bridge is arranged as in Fig. 7 for measuring the self-inductance and effective resistance of a coil. If the setting of the standard condenser is 0.62 microfarad, and the variable resistance is 200 ohms, compute the impedance of the coil. The frequency is 1000 cycles per second.

Work out the answers to these problems and hold them to compare with the correct answers. These will be published with the next installment of this series of articles on electrical fundamentals written for the telephone worker.

The Federal Social Security Law

THE SOCIAL SECURITY Act has been passed by Congress and signed by the President; it is now law. To meet the cost of certain of the benefits instituted by the law, new taxes are established upon both employer and employe. It is important that telephone companies and their employes—both of which are affected by the law—understand and make provision for their respective obligations under it.

There are certain miscellaneous provisions of the law which need not concern us here; they are Federal grants to the states for such social activities as aid to dependent and crippled children, to the blind, and for maternal and child welfare and so on.

These are additional to the two major purposes of the law, which are to establish old-age benefits or pensions, and unemployment benefits. The new taxes specifically provided for by the law are in connection with these two major activities.

THE LAW sets up a full-fledged Federal old-age pension plan for people (with some exceptions) who have been employed on salary or wages, and imposes a tax upon both employer and employe to maintain it. This tax begins with the calendar year 1937, and applies to all salaries and wages up to $3,000 a year for each employe.

This tax is 1 per cent on such salaries and wages for the years 1937, 1938 and 1939, 1½ per cent for the next three years, 2 per cent for the next three years, stepping up ½ of 1 per cent a year each three years until it becomes 3 per cent a year beginning with 1949. The tax is collected by the Bureau of Internal Revenue, which is to fix the dates and method of its payment. It is not deductible as an expense for income tax purposes.

This means that both employer and employe will pay, beginning with 1937, taxes at the rates just stated, on wages paid and received up to $3,000 annually per employe. If an employe receives more than $3,000 yearly, the tax applies to only $3,000 of his pay. The employer is required to deduct the employe's tax from the employe's pay and turn it over, together with the employer's own tax, to the government.

THE LAW also provides for grants by the Federal government to states having approved old-age benefit plans of their own. In such cases the Federal government will contribute to the state an amount up to but not exceeding $15 a month, to match the amount the state itself pays an individual as old age benefit. Such old-age benefits do not necessarily apply only to people who have been employed, but provide assistance to any indigent old people

If the state itself assesses a tax against employer or employe or both, for the maintenance of the state's own old-age benefit plan, such assessment will be in addition to the foregoing taxes to be paid the Federal government. There is no credit allowed by the Federal government, against its taxes, for amounts paid by an employer or employe to a state for the maintenance of a state benefit plan.

IN ADDITION to the old-age benefits outlined, the new Federal law makes provision for unemployment benefits and imposes a tax upon all employers of eight or more persons for the maintenance of such benefits. Unemployment benefits are to be paid by the states, the Federal government making grants of money to states having approved unemployment benefit plans.

To provide the money for this purpose, the Federal government will, beginning with the calendar year 1936, collect from employers of eight or more persons, a tax of 1 per cent on such employer's total payroll. This tax is increased to 2 per cent for 1937, and is 3 per cent for 1938 and each year thereafter.

This tax is also collected by the Bureau of Internal Revenue. The tax for each year will be payable, like income taxes, during the following year. It is apparently deductible, as an expense, for income tax purposes. Further, if the state itself assesses a tax against the employer for the payment, by the state, of unemployment benefits, the tax paid to the state is a credit against the tax due the Federal government, up to 90 per cent of the tax due the Federal government.

TELEPHONE MANAGEMENTS employing eight or more people should note that they must, therefore, make provisions for two new kinds of taxes: one, beginning with 1936, on their entire payroll; another, beginning with 1937, on salaries and wages paid all employes up to $3,000 a year for each employe.

The companies are also required to deduct from the pay of employes, beginning with 1937, the employe's own tax on his salary, in connection with the old-age pension plan. The telephone company subject thereto should, of course, begin to accrue the first of these taxes on its books, as an expense, beginning with the month of January, 1936.

No provision is made in the new Federal law with respect to private pension plans. An amendment to the bill during its consideration by Congress, designed to exempt from the law those companies maintaining pension plans of their own which met certain requirements, was eliminated from the law before its passage.

While it is said that the next session of Congress will give further consideration to recognition of private pension plans, and may amend the law, it must at present be assumed that payments made by a company to employes under the company's own pension plan would be in addition to those provided for by the new Federal law, and

also to those that are or that may be provided for in the future by different state laws.

It is a question whether any utility company limited to rates fixed by regulatory bodies, could afford to continue a pension plan of its own for the benefit of all or any of its employes, and also meet the new taxes imposed upon it by the Social Security Act. Probably only experience can bring the answer.

Federal old-age pensions for people (with some exceptions) who have been employed for salary or wages, begin in 1942. They are payable to retired employes who have then reached, or who afterwards reach, the age of 65. For the information and assistance of telephone companies and telephone employes, TELEPHONY is now having prepared a complete analysis of the Social Security Act, and of various state laws now in effect covering old-age pensions and unemployment benefits. This will be published in an early issue.

THE HONOR ROLL

Safety Test Number 5, published in TELEPHONY of July 29, caused many telephone workers to sharpen their pencils, grab a pad of paper, retire to a quiet corner and prepare their answers to the questions. As a result the number of entries far exceeded those of our previous tests. After carefully checking the papers we have chosen the best ones and have placed the names of the following men on our August Honor Roll.

FIRST PLACE: T. D. McNeal of The Chesapeake & Potomac Telephone Co., Charleston, W. Va., and James E. DeVoy, of The Mid-West States Telephone Co. of Wisconsin, Fond du Lac, Wis.; grades of 100.

SECOND PLACE: F. A. Yarbrough, of the Georgia Continental Telephone Co., Monroe, Ga.; B. E. Eison, of The South Carolina Continental Telephone Co., Abbeville, S. C.; Harry G. Culver, of The Mid-West States Telephone Co. of Wisconsin, Oakfield, Wis., and R. W. Little, of The Mid-West States Telephone Co. of Wisconsin, Fond du Lac, Wis.; grades of 98.

THIRD PLACE: H. H. Wilson, of The South Carolina Continental Telephone Co., Kingstree, S. C.; grade of 97.

FOURTH PLACE: J. P. Borden, safety supervisor, of The South East Public Service Corp. of Virginia, Charlotteville, Va.; W. E. Butts, of The South Carolina Continental Telephone Co., Kingstree, S. C.; R. R. Hollister, of Iowa Union Telephone Co., Forest City, Iowa, and Warren Stanley, of the Byron Telephone Co., Byron, Ill.; grades of 96.

FIFTH PLACE: Guy Loftus, of Farmers New Era Telephone Co., Wilmot, Wis., and D. W. Wells, of The Mid-West States Utilities Co., Trinity, Texas; grades of 95.

HONORABLE MENTION: A. B. Erskine, Richardson, Texas, grade of 94; George Byars, Johnson City, Texas, grade of 93; W. J. Ryan, Emmetsburgh, Iowa, grade of 93; J. E. Barnett, Conway, S. C., grade of 91; Robert DeVore, Hastings, Neb., grade of 91; B. E. Hardin, Winnsboro, S. C., grade of 90; E. H. Danner, Durham, N. C., grade of 90.

There are the winners, and the grades prove that competition was close. Congratulations to every Buddy who made the August Honor Roll. Keep up the good work.

Your old buddy,
JAKE, THE LINEMAN.

Answers to Safety Test Number 5

By JAKE THE LINEMAN

MORNIN' BUDDIES! Wa'll once again we have had a great safety test. Believe you me, my little old desk sure did a heap of groanin' as the papers kept comin' in and weightin' it down. An' I guess, that before I got through checkin' an' rechekin' the papers I did a little groanin' myself. These old eyes of mine had been through many a safety test—but never had they been in one where the competition was so keen. Actually it seemed as though every entrant was tryin' his all-fired best to make The Honor Roll.

I had to do a powerful lot of checkin' and rechekin' 'fore I could get my old thinker to pick out the best papers. But I finally succeeded and on this page you will find The Honor Roll, listing the names of the buddies who submitted the best papers.

To every telephone worker whose name is listed goes my heartiest congratulations. Your papers had to be practically perfect to even get *near* The Honor Roll of Test Number 5; and by being among the winners you have showed a good knowledge of safety as applied to your everyday work, and you have also shown that you're interested in your work and willing to devote your time and energy to its study. Those qualities are assets which should carry you far.

I can't forget you buddies who barely missed, for you really gave the winners a real race for the honors. Keep up your interest in Safety. It's one interest that really pays.

And now before we get into the answers, what say we take up a few highlights of the test? The first interesting fact is that the tests are developing some interesting competition between two companies who are sponsoring the group participation of their employees in the tests. This month The Mid-West States Utilities Co. has ten employes listed on The Honor Roll. Following close behind are The South Carolina and Georgia Continental telephone companies with a total of seven employes on The Honor Roll. It will be interesting, during the coming tests, to watch the competition which is developing between the different companies whose employes are participating in the tests. I jist wonder which company will have the most employes on our next Honor Roll.

The second interesting high-light is the fact that through questions 6 and 7 of Safety Test Number 5 we discovered that some telephone employes were unfamiliar with the minimum vertical clearance

which should be observed on all joint poles. I hope that those who missed out on the answers to those two questions will pay particular attention to the correct answers, as it is very important that all plant men be familiar with the correct clearances.

Wa'll I guess that's about enuf, so what say we start on the answers?

Question One: Because of the fact that many telephone lines are built along railroad right-of-ways which are hard to get to with trucks and trailers, it is sometimes necessary to unload poles from moving trains. On such jobs should: (A) Poles longer than 35 feet be unloaded while the train is in motion? (B) A protection be placed between the ends of the cars on which men will be working to do away with any possibility of the men falling between the moving cars? If so, what kind of protection should be used? (C) Should "Cant Hooks" or "Peavies" be used to shift and move the poles?

ANSWER: (By B. E. Eison, of The South Carolina Continental Telephone Co., Abbeville, S. C.): "(A) Poles longer than 35 feet should not be unloaded while the train is in motion. (B) Regardless of whether cars are being unloaded while in motion or stopped, a net of wire mesh or tarpaulin should be placed between the ends of all cars on which men will be working and the adjacent car in order to preclude the possibility of men accidentally falling between the cars. The wire net or tarpaulin should be approximately five feet wide and eight feet long, with each of the four corners of ½ inch manila rope tied in square knots. (C) Peavies can be used to a better advantage in moving and shifting pole on cars than 'cant hooks.'"

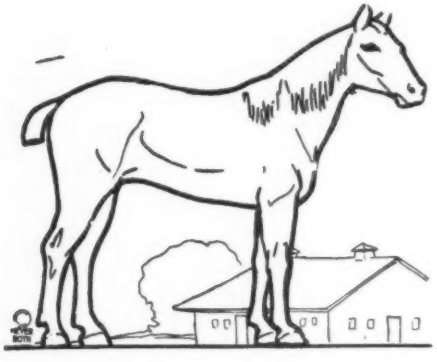
Question Two: In inspecting screwdrivers for defects, what important conditions should you be on the lookout for?

ANSWER: The inspection of screwdrivers for defects seems to be unimportant but accident reports prove that many workers sustain serious hand injuries through using defective screwdrivers, and the same accident reports prove that inspection of screwdrivers for defects is important.

When inspecting screwdrivers for defects be on the lookout for the following irregularities:

1. Blade loose in the handle.
2. Broken blade.
3. Bent blade.
4. Chipped, worn or improperly shaped blade.
5. Handle split, broken, cracked or the head badly mushroomed.

In addition to inspecting screwdrivers for the above-mentioned defects it is also important that you observe the following precautions when you are using a screwdriver: (a) Never use a screwdriver as a chisel, drill or pinch bar. (b) Never carry your screwdriver in a pocket where exposure of its blade may cause an injury. (c) Remember that burred screw slots often cause a screwdriver to slip—and that slips cause accidents. (d) Use the size or screwdriver which fits the size of screws you are using. (e) When working with a screwdriver always have it in such a position that if it slips it will not injure you or a fellow worker. (f) Never use a screwdriver as a substitute for a soldering copper.



JAKE SAYS:

"The Horse Had One Point in His Favor—He Never Ran Into a Telephone Pole Even Though His Driver Was Feeble-Minded."

Question Three: Suppose one of your buddies has been overcome by gas while working in a manhole, how would you rescue him? If his breathing had stopped how would you attempt to revive him? Answer each part fully.

ANSWER: (By R. W. Little, of The Mid-West States Telephone Co. of Wisconsin, Fond du Lac, Wis.): "Before going into a manhole to rescue a person who has been overcome by gas get a handline. Pass one end of the handline twice around your own body and have it tied securely. Take the other end of the line down into the manhole with you and secure it to the victim just as it is secured to you. Leave the loop on the outside of the manhole. Assistants can then pull you out if you are overcome. If breathing has stopped, artificial respiration should be started at once. Remember that every moment of delay is serious and may determine the life or death of the patient."

In addition to Mr. Little's suggestions, remember the following pointers: (a) Before entering the manhole make sure that you have a capable helper on the outside to aid if *you* are overcome. (b) Take a few deep breaths and if possible hold your breath while in the manhole. (c) Move quickly and make every movement count. (d) After you get the victim out of the manhole remember that he must have all the fresh air he can get *but this does not mean cold air. Cold will kill a man who has been gassed, from shock.* (e) After the victim has recovered consciousness he should be kept warm, well-covered and quiet.

Question Four: Answer the following questions either "yes" or "no."

(A) Do stopping distances depend largely upon how fast a car is travelling?

ANSWER: *Yes.* Tests prove that a car going 20 miles per hour is travelling 29 feet per second and will travel approximately 38 feet after the brake is applied before coming to a complete stop, and that a car going 60 miles per hour is going 88 feet per second and will travel approximately 263 feet after the brake is applied before coming to a complete stop.

(B) In residential sections where cars may be parked in driveways, for the safety of the children is it safe to park at the curb?

ANSWER: *No.* A car has a habit of drawing the attention of children. If it is parked in the street they have a tendency to center their games near it. Thus by parking your car in the street you draw the attention of your children to the street. Last year there were 47,690 little children injured while playing in the street. Of this number, 1,800 suffered injuries which caused their deaths." Enuf said.

(C) Can a pedestrian cross a street more safely in the middle of the block than at marked intersections?

ANSWER: *No.* During 1934 five out of every eight pedestrians killed were involved in accidents while crossing streets in the middle of the block, crossing intersections against signals or diagonally, darting out into streets from behind parked cars, or while working along rural highways.

(D) Is it dangerous to pass another car on the right because the driver of it may suddenly pull over to the right and crowd the passing car to the curb or off the street?

ANSWER: *Yes.* Last year motorists who passed on the wrong side caused 2,800 accidents in which 3,040 persons were injured and 70 were killed.

Question Five: In hoisting hot paraffin or metal up to a splicer should the

dipper or ladle be left in the pot? Give reasons for your answer.

ANSWER: (By J. E. Barnett, of The South Carolina Continental Telephone Co., Conway, S. C.): "No, the ladle or dipper should never be left in the pot. At no time should a helper leave a dipper or ladle in pots of hot liquid which are being pulled up to the splicer as the handle of the dipper or ladle will cause one side of the pot to be heavier and, therefore, give it a tendency to tilt. Also, in pulling up the hot stuff the handle may catch on something and cause the pot to overturn."

Question Six: On a jointly-owned pole what should be the vertical clearance between the telephone company's crossarm and the power company's crossarm?

ANSWER: On a jointly-owned pole the vertical clearance between the telephone company's crossarm and the power company's crossarm, measured from center to center, should not be less than 48 inches.

Question Seven: In your opinion should the following conditions be classed as hazardous? Explain reasons for your answers.

(A) Power company's transformer on a telephone company pole below the telephone company circuits?

ANSWER: (By James E. DeVoy, of The Mid-West States Telephone Co., of Wisconsin, Fond du Lac, Wis.): "The condition would be classed as hazardous because a telephone lineman is not prepared to work around electric wires and transformers. A transformer should not be hung below a telephone crossarm. The braces holding the crossarm might be charged and, therefore, at least 40 inches clearances should be had between the lowest point of the transformer and the top of the wires on the top arm of the telephone company's crossarm. Only experienced power company linemen should crawl around transformers.

(B) Telephone company pole line with power company crossarm below the telephone company's cable?

ANSWER: (By James E. DeVoy): "If a power company had a line under a telephone cable it would be unsafe to a cable splicer or helper as there wouldn't be proper clearance to swing a cable platform or raise or lower tools or ride a cable car without endangering the worker's life."

(C) A 2,300-volt power company circuit over a telephone company circuit with only a ten-inch clearance?

ANSWER: (By James E. DeVoy): "Such a small clearance would be dangerous. Such a circuit would require a 48-inch clearance."

Question Eight: In your opinion what careless action caused this accident? "A cable splicer's helper was working under a cable platform upon which a cable splicer was cutting a piece of lead sheath off a cable. After removing the sheath the splicer laid it on the platform. It slipped. The splicer yelled 'Look Out!' The helper looked up, and the piece of lead sheath hit him in the mouth."

ANSWER: (By B. E. Hardin of The South Carolina Continental Telephone Co., Winnsboro, S. C.): "My opinion of this accident is as follows: First the helper did not use precaution. If he had he would never have been under the splicer while he was working above. Second, the splicer did not use precaution. If he had he would have lowered the piece of lead sheath to the ground as soon as it was cut off. Tools or materials should never be laid loose on the platform, for they may fall off and cause a serious accident. If both splicer and helper had used precaution, the accident would never have happened."

Question Nine: What precautions should be taken when using a lineman's test set on open-wire lines to locate trouble when tests made by the testboard indicate that the trouble is due from contact with electric supply circuits? Explain fully.

ANSWER: (By James E. DeVoy): "When tests show that an open-wire circuit is in contact with electric circuits, the first precaution I'd use would be to stay off of it with a test set. I'd notify the power company and let them clear the hot wire. I'd drive over the telephone line and try to locate the trouble; then if it were not too high a voltage I would endeavor to throw a handline over the wire which was causing the trouble and pull it off. If it were a rural line a worker could drive along the line and tell the subscribers to keep away from the telephone until the trouble was fixed. I wouldn't use a test set because the 'hot stuff' would probably burn either myself or the test set."

Question Ten: If you discover a hazard which will prevent you from doing your work safely what procedure should you follow?

ANSWER: (By Robert DeVore, of The Lincoln Telephone & Telegraph Co., Hastings, Neb.) "Upon finding a hazardous condition which will prevent you from doing your work immediately, determine from a safe distance the cause of the hazard and then notify your supervisor. He should arrange with the company or people at fault to have the hazard cleared. Do not work on the project until the hazard has been removed and if such condition presents a danger to the public, either station a man there to warn the people or place warning signs and signals. Your responsibility does not end after you have notified your supervisor, *but when the trouble has been cleared.*"

Wa'll there are all of the answers and here's hopin' that they have helped. I guess that I'll be goin'—but I'll be back next Saturday with another test. So be on hand. Until then remember: "The penalty for the slightest deviation from carefulness is often disastrous."

• • •

COMING CONVENTIONS

United States Independent Telephone Association, Tower Room, Stevens Hotel, Chicago, October 8, 9, 10 and 11.

Independent Pioneer Telephone Association of the United States, Stevens Hotel, Chicago, October 10; Annual Luncheon.

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, November 14 and 15.

Iowa Independent Telephone Association, Hotel Fort Des Moines, Des Moines, April 7, 8 and 9, 1936.

Nebraska Association Plans September District Meetings

Rains in the early summer, followed by floods and then drouth, along with the depression, prevented Secretary George M. Kloidy, of the Nebraska Telephone Association, Lincoln, from carrying out tentative plans for district meetings, a system that has been in vogue for several years and which has resulted most successfully in stimulating interest in the business and in the association. Mr. Kloidy is now planning for a series of these meetings in September, but they will all be of the small group variety, to be addressed by experts from the larger companies.

• • •

Michigan Bell's Tax Is $7.26 Per Telephone

The Michigan Bell Telephone Co. will pay in taxes this year $7.26 per telephone, based on the average number of telephones it operated in 1934. This is approximately $1.00 more per telephone than it paid last year. It requires the net earnings from 187,600 telephones, or nearly 38 per cent of the average number the company operated last year, to pay the tax bill, which will amount to $3,594,000.

In addition to its state tax, the Michigan Bell company will pay the federal government approximately $809,000 this year, and its miscellaneous local taxes will approximate $47,000.

TELEPHONE & TELEGRAPH WEATHER REPORT:
Continued Fair, with cloudless skies.

Telephone

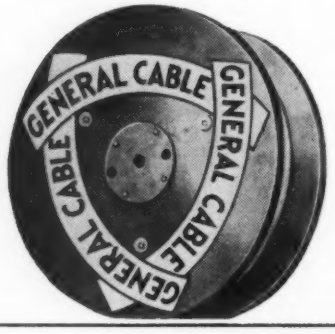
Published on Occa

VOL. I . . NO. 1

Extension of Service Announced Here Rounds Out Complete Line of Wires & Cables

American Automatic Electric Sales Company is now in a position to supply every conductor need of the telephone company:

- Bare and Insulated Wire for Aerial Circuits
- Copperweld & Bronze Drop Wires
- Braid Covered Inside Telephone Wire
- Wire for Grounding Circuits



Copperweld Drop Wire —an Important Item

Industry engineers agree that Copperweld embodies electrical and mechanical efficiency of unquestioned superior merit. With the added advantage of General Cable insulation and finishing, it makes a Drop Wire which wins preference by long life service economy.

AMERICAN SALES TO PHONE C

Made in All Sizes

300 pair Paper Telephone Cable made by General Cable Corporation

Engineers who visit the General Cable plant are interested in the improved process of removing the last infinitesimal bit of moisture from a complete paper telephone cable. Alternate vacuum exhaustion and filling with CO_2 gas under pressure achieves remarkable results.

...ustry News

...al Cable Corporation

★ ★ ★ ★ ★
DEVOTED TO MORE EFFICIENT WIRE AND CABLE COMMUNICATION

...35 WIRES AND CABLES SECTION

...TOMATIC ELECTRIC ...TRIBUTE PAPER TELE- ...ES FOR GENERAL CABLE

...y, August 1, 1935. — At the offices of General Cable Corporation it was ...day, that this well known distributor of telephone supplies would hence- ...xclusive sale of this manufacturer's "STANDARD UNDERGROUND" ...one Cables to the telephone companies. This is important news, and prom- ...ow-up of the needs of individual companies and the industry.

Exclusive Distributorship Interests Industry

Telephone Engineers Report Gratification in New Line-up

"To be able to discuss Paper Telephone Cable needs with American Automatic Electric Sales Company is going to be fine from our viewpoint." Such was the telephone companies' reaction to an announcement made today, as reported by our forecasting service. It went on to comment that the sales-engineering staff of the newly appointed distributor was admirably able to discuss cable engineering problems and the qualifications of the present standard product to meet them. While the manufacturer of "STANDARD UNDERGROUND" has maintained an intimate contact with the communications field, it is nevertheless a fact that the larger telephone industry sales organization of the distributor will facilitate the degree of direct and frequent personal contact that is so desirable.

At the Chicago office, 1033 West Van Buren St., the Kansas City office, 2025 Main St. and the San Francisco office, 235 Montgomery St., headquarters engineers will be available to consult on any unusual problems or service requirements.

Modern methods of manufacture have brought about such uniform perfection of General Cable "STANDARD UNDERGROUND" dry core, paper telephone cable as to assure trouble free service. In this regard, the product in question is a standard in the industry. None better can be had, today.

Recognizing this, it is natural that the industry should welcome the opportunity to discuss their cable needs with the sales engineering staff of American Automatic Sales Company.

...t Made 40 ... Standard ...dCableCo.

...y Years ... of the Industry"

...ables made by General ...f improved design de- ... "STANDARD UN- ... some years ago be- ... organization. ...dards of quality still ...anufacture have been ... more efficient design — ...tanding of the original ...ot be bettered. General ...me tradition.

...-t noreen and

Joining Telephone and Power Cable Sheath by Means of Cast Joints

By J. W. CHANNELL
Southgate, Calif.

Wiping of cable joints a real problem because of the high degree of skill necessary which is only acquired after long practice. Method developed recently by means of which the cable joint can be cast instead of wiped by hand, permitting the use of a 50-50 solder and insuring a perfect seal as well as materially cutting down the cost of joining cable sheaths

WITH the introduction and development of cable for carrying telephone circuits, early in the history of the industry came also the introduction of a new craft—the cable-splicer's craft. And just as the design and manufacture of telephone and power cable has evolved from crude beginnings to the production of the many fine types of cable on the market today, so have the methods of installing and splicing cable developed from equally crude beginnings to the highly-skilled and efficient craftsmanship we see in the cable splicer of today.

The first cable consisted of lead pipes into which insulated wires were drawn by hand. After two sections were spliced together, a plumber was employed to place the lead sleeve and wipe the cable-sheath joint. The use of plumbers for this purpose continued until it became more and more evident, with the ever-increasing use of cable, that this practice was impractical and that the only solution was in training the splicer to wipe joints. Cable-splicing from then on became an occupation requiring considerable skill and versatility, and the cable-splicing craft definitely moved into the skilled labor class.

With the development of larger cables and larger and more intricate cable systems, complicated branch splices became more numerous and also more difficult to join. As an aid in finishing these large wiped joints, blow-torches were introduced and they became a standard item in the splicer's tool kit. The use of the blow-torch aided considerably in obtaining a neat, thoroughly dependable and finished joint.

However, it also involved an ever-present danger from fire and explosion, particularly in manholes where gas might accumulate. While this danger was perhaps not as great as was feared, it came to be regarded by the telephone companies as too serious a hazard to justify the use of blow-torches. Consequently, it was finally decided by most of the companies to discontinue the practice and to require splicers to wipe all joints by hand.

This decision immediately presented

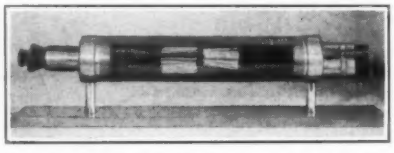


Fig. 1. Cast Sheath Joints on a 909-Pair Cable with a 101-Pair Stub. The Splice Was Made with the New Model Channell Splicing Machine.

a problem: Most of the then current generation of splicers had learned to wipe joints with the blow-torches and were unable to do so without it. Most of them, also, were reluctant to give up the torches and learn a new method. It became necessary to overcome this reluctance and to teach the splicing forces to wipe and finish all types of joints with the wiping cloths alone.

This process was undertaken by most

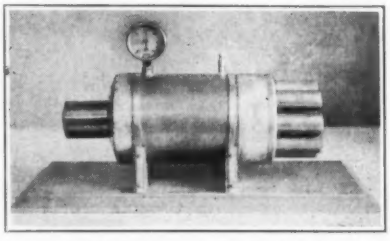


Fig. 2. Joints Cast on an 1818-Pair Cable with Nine 202-Pair Stubs.

of the industry, and it was generally a slow and expensive process to carry out. Through the medium of training schools, cable splicers were taught, a few at a time; and all helpers and apprentices coming into the business were trained to wipe joints without the blow-torch.

But the wiping of joints continues to be a problem in cable splicing. It requires a high degree of skill, which can be acquired only after long practice. Indeed, some men never succeed in mastering the art satisfactorily and are, thereby, handicapped to that extent throughout their careers.

Many of the larger telephone companies maintain schools in which apprentices and helpers are aided in learning metal work during training periods. Such schools are, of course, of considerable help; but it is only after long experience on the job, in wiping all types of joints under all conditions, that the splicer becomes expert in metal work. And until all members of the splicing force are experts at this important and difficult phase of the job, the company suffers the penalty of getting less than perfect cable installations, with attendant troubles, service interruptions, and high maintenance expense.

Many Difficulties Involved in Wiping a Joint

The difficulties involved in wiping a joint have been the subject of much study on the part of the telephone companies and other industries having occasion to face the problem. The developing of proper solder for this purpose has been most important, since it is essential to use a solder having the characteristic of changing from the molten to the solid state at a rate slow enough to permit shaping and finishing the joint before this change is complete. Also, the finished joint must be non-porous.

The ideal solder from the standpoint of the finished joint, 50-50 solder (50 per cent tin and 50 per cent lead), cannot be used because it hardens too rapidly to permit shaping the joint. On the other hand, any solder having a lead content greater than 62 per cent (38-62 solder) is unsatisfactory because the finished joint will be porous and not proof against moisture. The wiping solders now in use are generally 38-62 and 40-60.

Even under the most favorable conditions, the wiping method of joining a cable sheath has many objectionable features. The novice has to face the mental hazard of burns from the hot metal (which is a real danger as well) and to undergo the long practice required to become proficient. The meth-

od involves considerable waste of metal since most of the wipings, although dropped into a catch-pan, are not recovered in reusable condition. The process also requires too great a portion of the time consumed on the total splicing job.

Some large central-office splices and similar jobs take as much as eight hours for wiping the joint alone. Joints wiped in restricted space, as in buildings and small crowded manholes, also require extra time. In such locations, moreover, the danger of burns is much greater and it is more difficult in every way to complete the joint satisfactorily.

Cable sheath joints wiped by other than experts are very apt to be affected by sheath burns or damaged sleeves. Moreover, splicers who have trouble in finishing difficult joints are sometimes tempted to "dope" the solder by adding lead. While this renders the wiping process easier, it is quite apt to result in a porous joint.

Until recently there have been no improvements in the practice of joining cable sheath, except as discussed here, since the wiped joint was originated. In view of the objections involved in wiping joints by hand, it is surprising that a more efficient method has not been devised before this. However, the need for improvement has long been recognized, and a method has now been developed by which joints can be cast, Fig. 1, instead of wiped.

Very little skill or training is required with this new method, as it is only a matter of heating the solder to the proper temperature and pouring it into a mould. This eliminates the danger of melting the sleeve or cable and reduces the hazard from burns. Another advantage is offered in that solder with a higher percentage of tin can be used. The joints made by this method and shown in the accompanying illustrations were cast with 50-50 solder, insuring a perfect seal. (Note that the joints shown in the illustrations are under 15 pounds air pressure.)

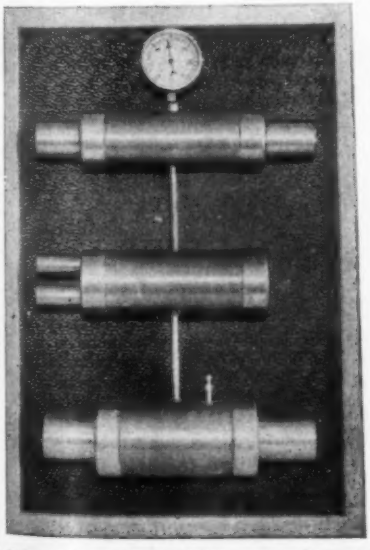


Fig. 3. These Sheath Joints on 3, 3½ and 4-Inch Sleeves, Were Cast Under 15 Pounds Pressure by the Same Mould.

J. W. CHANNEL, Who Developed the Method of Casting Cable Sheaths Described in This Article, Is Also Inventor of the Channell Splicing Machine. It Has a Record of Completing a 1212-Pair Telephone Cable Splice in Eight Hours. In His 21 Years' Experience in Cable Work, Mr. Channell Has Spliced All Types of Telephone and Power Cable. He Has Also Assisted in Submarine Cable Installations for the U. S. Government. He Has Conducted a Number of Splicing Schools for One of the Larger Telephone Companies, in Which More Than 500 Splicers Have Learned Their Craft.

The new method offers substantial saving in time and material, besides assuring a perfect seal. The time required for casting a joint with the mould is a small fraction of the time necessary in wiping a joint of equivalent size. Less solder is required for a cast joint, and waste is entirely eliminated. The joints shown in the illustrations are 1½ in. wide. Similar joints wiped by hand would be about 2¼ in. wide.

In casting large joints, disks are used, thus eliminating the necessity for beating in the sleeve and permitting the use of shorter sleeves. The disks also tend to aid in preserving the shape of the sleeve.

Joints can be cast by this method on all types and sizes of lead cable, for any type of straight or branch splice, Fig. 2. One mould can be used for casting joints for three different sizes of sleeve. For example, different sized joints shown in Fig. 3 were cast with one mould.

Of even greater significance is the application of this cast joint method to power cable installations. Power cables, particularly the types used for high voltage transmission, require special installation methods, and the joining of these cables is generally more difficult and exacting than in any other type of cable. The sleeves used are much larger and heavier, being as much as eight inches in diameter, with armor ⅜ths to ⅝ths of an inch thick, and weighing as much as 65 pounds.

The placing of these sleeves, properly beating in the ends and hand-wiping the joints, constitutes perhaps the most costly and difficult cable-joining feat in the industry. The use of the new cast joint method in such work offers a substantial saving in time and material, and a much more efficient and dependable joint as well.

An example of a cast joint on power transmission cable is shown in Fig. 4 on this page. The cable is a section of 750 M circ. mil., three-conductor cable, oil-cooled and designed for 33KV transmission. The joints are made on an eight-inch sleeve, and lead disks were used, thus avoiding the necessity of beating in the sleeve end. The joints were then cast with 50-50 solder. Tests have shown these joints to be perfect in every way.

Similar joints can be cast on any and all types of power cable, using the same mold, in a small fraction of the time required to wipe the same joints by hand.

The cast joint method offers a tremendous saving in both telephone and power cable splicing costs, and it is anticipated that this method will soon come into general use and eventually replace the hand-wiping method entirely.

• • •

Recent Prices in the Metal Market

New York, N. Y., August 19: Copper —Firm. Electrolytic spot and future, 8.50c per lb. Tin—Strong; spot and nearby, 50.12c per lb.; future, 49.50c Lead—Steady; spot New York, 4.20@ 4.25c per lb.; East St. Louis, 4.05c. Zinc —Firmer; East St. Louis, spot and future, 4.60c per lb.

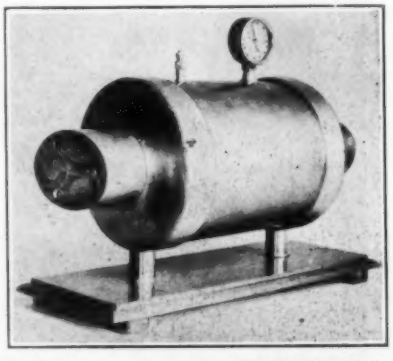


Fig. 4. Joints Cast on a 750,000 Circ. Mil. Three-Conductor Power Cable, Using an Eight-Inch Lead Sleeve.

TOLL ADVE

"Can you and Tom come up here for the week-end?"
Use your telephone to keep in touch with friends or family scattered on vacation . . . to make reservations . . . to extend or accept invitations. A telephone call gives pleasure and peace of mind. • After 7:00 P. M., you can talk to most points 75 miles away for 35c; 150 miles for 50c; 275 miles for 75c.* . Try it tonight.
(*Three-minute, station-to-station calls)
"Just try to keep us away!"

ERTISING

TAKES NO VACATION

Residence Toll advertising works while the rest of the world is vacationing. The advertisement on the opposite page met millions of week-enders, traveling friends, scattered families . . . in the pages of national magazines during July and August . . . at a time when they needed telephone toll service to make plans, reservations, and all kinds of friendly, human contacts. • Timely telephone advertising keyed to the needs of the public should bring business to the whole industry.

An Advertisement of the Bell Telephone System

Magnificent New Chicago Post Office, One of the Largest Buildings in the World, Constructed Over Railroad Tracks Upon Which Steam Locomotives Are Operated.

Telephone System Of New Chicago Post Office

By L. A. CUTSHALL
Sales Engineer, American Automatic Electric Sales Co.

A CITY within a city! One tremendous building, under whose roof the mail of a good share of the entire Middle West is daily classified, sorted and sent on to its proper destination; employes numbering over 7,000 which force is further increased every year during the several weeks of the Christmas rush, by the temporary addition of several thousand extra workers!

This is just a glimpse of the new post office building recently completed in Chicago—one of the largest projects of its kind in the world. Responsible for the smooth functioning of this huge undertaking are Ernest J. Kruetgen, postmaster of the city of Chicago, and the assistant postmaster, John T. McGrath.

An idea of the enormous size of the building may be had from the fact that it is one block wide and two blocks long, with a height of 12 stories and a total floor area of 18 city blocks.

Constructed directly over the tracks and platforms of the Chicago Union Station, it is by far the most extensive development of air-rights in the world over tracks on which steam locomotives are operated.

It is interesting to note that the building proper covers 15 actively-used tracks, the smoke from which is drawn by huge fans to the top of the building through enormous flues, and is expelled into the atmosphere 12 stories above street level.

Here indeed is an enterprise requiring complete and instant co-ordination of all divisions and departments. Great conveyor belts carry an uninterrupted stream of mail and parcel post packages from trains to distribution points, from one floor to another, from one department to other departments—all properly timed and interrelated in their function of speeding up the handling of enormous quantities of mail.

It can be seen how important it is that all departments and divisions have instant and accurate facilities for telephone communication with one another,

(*Concluded on page* 30)

Ernest J. Kruetgen, Postmaster of the City of Chicago, at His Desk in the New Post Office Building, Using the Strowger P-A-X System With Special Executive's Key Cabinet.

LIGHTNING AT BOTH ENDS OF THE DROP

A These fuses were shattered by lightning entering a Cook S-6 Protected Terminal. THE TERMINAL WAS NOT DAMAGED AND NOT A CABLE PAIR WAS LOST.

B The same lightning discharge entered the subscriber's premises and destroyed his telephone. No Sub-Station Protector was installed! This was a privately owned telephone and this is just the way Mr. L. A. Graham, Manager of the Farmers' and Citizens' Telephone Co., of Union Star, Missouri picked what was left of the telephone off the floor. Fortunately, no one was in the home at the time and the fire damage was slight.

This telephone and the subscriber's home should have been protected by a Cook Substation Protector.

C A Cook O-7 Sub-station Protector mounted at the point of drop wire entrance offers a path to ground for such destructive potentials. The full length A-7 fuses will open the circuit between the drop wire and the instrument.

Cook O-7 Sub-station Protector is fully enclosed, weatherproof, fireproof, can be mounted outdoors or indoors and costs $1.10 each; lots of 100, $1.00 each.

Any public utility that does not provide proper protection facilities is in a very poor position in event of court action.

Ask Your Jobber's Salesman About Cook O-7

COOK ELECTRIC CO. 2700 SOUTHPORT AVE., CHICAGO

(*Concluded from page* 28)

and ready access to literally every nook and corner of this vast building for the proper timing of all these related activities.

With this in mind, it is not difficult to understand the importance of the Strowger P-A-X (private automatic exchange) which was chosen for this great enterprise. Particularly gratifying to Automatic Electric Co., the makers of P-A-X, was the fact that post office officials had been given a thorough opportunity to test out every phase of P-A-X operation during the ten years the former 100-line P-A-X was in use. This original system was installed in the previous railway mail building during the year 1925.

John T. McGrath, Assistant Postmaster of the City of Chicago, Shown Using the Special Executive's Key Cabinet Furnished With the Strowger P-A-X System.

The new 500-line system utilizes the former equipment in its entirety, the additional apparatus consisting of four new 100-line units, with selector switches, additional connector switches, and miscellaneous trunking equipment to change the former 100-line two-digit system, to a 500-line three-digit system. Naturally, additional power equipment also was furnished to care for the increased load of the new system.

Of interest to the telephone engineer is the fact that the present system can be still further enlarged when more telephones are desired or when any increase in the calling rate may make necessary the expansion of the exchange facilities.

The supervision of the P-A-X equipment is in charge of P. J. Madigan, superintendent of the mechanical department of the post office.

In addition to the instant direct station-to-station communication service "on tap" during any hour of the 24, several interesting and highly useful "special service" features are provided.

One of the problems to be solved was that of finding a mechanic or a supervisor who might be anywhere in the 18 square blocks of floor area in this vast building. This feat is accomplished in just a few seconds by the use of the automatic code call or paging service furnished as a special feature of the P-A-X system. This service consists of a large number of audible signals distributed at strategic points throughout the building, and which emit single-stroke chimes of a pleasing musical tone.

These chimes are actuated automatically in accordance with prearranged codes, such as a single stroke followed by three quick strokes—which would be code 1-3. This might be the code assigned, for instance, to the chief electrician. Wherever he is in the building, upon hearing his code, he merely steps to the nearest P-A-X telephone and dials a certain number reserved for answering code calls. This puts him in immediate telephonic touch with the party who called him.

The codes are sent out automatically by a special automatic code machine, and any person can send out any code by first dialing a prearranged call number followed by the digits corresponding to the wanted person's code; in the case mentioned, 1 and then 3. The code is immediately sent out until the person answers or the calling party terminates the call by hanging up.

For the post office system, the building is divided into four separate code-call areas, designed to simplify the locating of different persons in their respective divisions. These areas are the mechanical section, the railway mail division, the city delivery division and the mailing division. The men assigned code call numbers are those whose duties are of a general or supervisory nature, and who are often away from their desks and consequently difficult to locate over the regular telephone circuits.

Another special service provided with the post office P-A-X system is the "executive's direct line" service. This service provides nine high executives with special key cabinets, of small size and handsomely finished for placing alongside the P-A-X telephone on the executive's desk.

By simply depressing the proper key on his cabinet, and without dialing, the executive is immediately connected with the telephone of any one of 25 selected subordinates. In addition to this, he can, of course, gain access to any other telephone in the system by dialing the three-digit number as usual. This automatic selection of 25 designated telephones is accomplished by the use of no more wires than are required for five regular telephones.

Facilities for keeping accurate studies of traffic densities and increases in calling rates, are provided in the equipping of each 100-line unit with a message register which gives the total number of calls passing through that unit. Also, message registers are provided to record the number of times when all trunks to regular selectors are busy.

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Community-Building Plan Is Successful

The Lincoln (Neb.) Telephone & Telegraph Co. made a net gain of 824 stations during the first seven months of the year, as compared with a loss of 146 during the same period last year. The sales drive still continues. Company employes have an average of 1.1 sales, regarded by General Manager J. H. Agee as an excellent record and better than most company returns he has seen.

The company now has 10 of its towns operating on the community-building plan, described at length in the March 23 issue of TELEPHONY. Letters from merchants highly commend the plan as being productive of increased sales of goods, and from telephone patrons who are pleased with the daily assortment of news and bargains sent them over the telephone wires.

Although no detailed check has been made upon the results as they affect the telephone company, it is noted that those exchanges, where this program adds to the value of telephone service, have had a better growth than others.

Deaths of Two Independent Men

GEORGE W. SCHWEER, for nearly three decades secretary and general manager of the Missouri Union Telephone Co., which he organized in 1899, and for many years one of the most active workers of the Missouri Telephone Association, passed away at his home in Clinton, Mo., on August 12, after suffering for some time from heart disease. He was 75 years of age.

While postmaster of the town of Windsor Mr. Schweer, in April, 1899, organized the Missouri Union Telephone Co. Under his direction as secretary and general manager, the company grew by leaps and bounds in the early days of Independent telephony; in 1927 it consisted of seven exchanges serving some 4,100 subscribers. In recent years the company maintained its headquarters in Clinton.

GEORGE W. SCHWEER, of Clinton, Mo., One of the Real Independent Pioneers, Who Entered the Field in 1899 and was Active for Nearly 30 Years in State and National Telephone Affairs, Passed Away on August 12 at the Age of 75.

After the properties were sold, about 1927, to the Standard Telephone Co., of Chicago, Mr. Schweer served for a time as district manager of the Osage Valley Telephone Co., with headquarters in Clinton.

For more than a score of years Mr. Schweer was affiliated with the Missouri Telephone Association in various executive capacities. He was president for four terms, secretary for six terms, as well as corresponding secretary for a number of terms. He was a director of the association for many years and served as vice-president as recently as 1930. In addition to his affiliations with the state association, he was president of the Sixth District Missouri Telephone Association for about 12 years.

Born in Gerald, Mo., February 16, 1860, Mr. Schweer lived a long and useful life in his native state. After his grade school education, he attended Missouri University for one year. After two years in the grocery business in St. Louis, Mo., and five years in the general merchandising business in New Haven (during which time he served as mayor of New Haven for two years) Mr. Schweer moved to Windsor.

He likewise engaged in the general merchandising business in that community, in which he continued for 10 years. He was postmaster of Windsor from 1897 to 1910. In 1899, as mentioned previously, he organized the Missouri Union Telephone Co. which grew and prospered in the succeeding years under Mr. Schweer's wise and prudent management.

Failing health compelled Mr. Schweer's retirement a few years ago from active participation in the work of the Missouri association and in the operation of the telephone properties he was largely responsible in developing. He is survived by his wife and eight children: four daughters, Ann of Clinton; Cora of Bremerton, Wash.; Mrs. Elmo Witcher of Chilhowee, Mo., and Mrs. H. F. Covington of Rio de Janeiro, and four sons, Guy of Clinton; Ted of Rolla, Mo.; J. C. of Independence, Mo., and Eugene of Bremerton, Wash.

Mr. Schweer was a member of the Independent Pioneer Telephone Association of the United States. In years past he had actively participated in the discussions at the National Independent conventions in Chicago. He was prominent in local Masonic and church circles and was formerly Republican national committeeman from Missouri.

▲

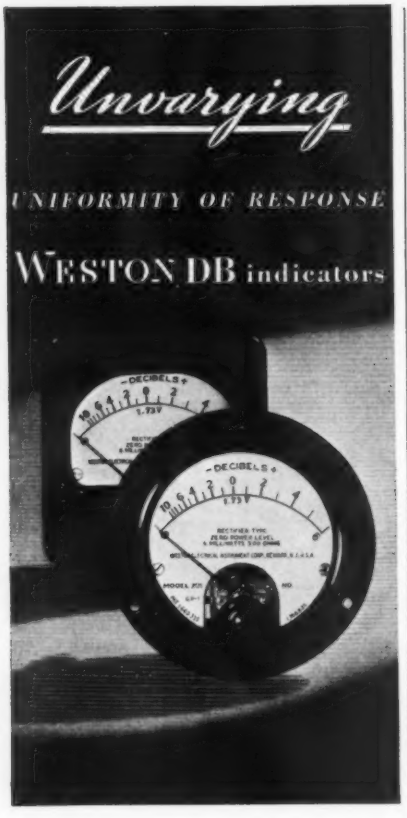
CHARLES E. MEALS, president of the Kittanning (Pa.) Telephone Co. for the past 14 years, passed away August 15 at the Kittanning General Hospital after a lingering illness, at the age of 63 years. Mr. Meals became a director of the company in October, 1908, and was elevated to the presidency in October, 1921. Up until his illness, he took keen interest in the work of the telephone company. He was a man of ex-

THE
INDUSTRY
MOVES ON

- Always progressing, ever adopting new methods when they prove the old ways out-of-date, the Telephone Industry constantly moves on to improved service, to new operating economies. This great Industry is even now taking in its stride a major improvement in dry batteries—the TWIN-SIX 3-Volt Telephone Battery. Thousands of these compact batteries are now helping Exchanges improve talking current and effect definite economies.
- The TWIN-SIX replaces two old round No. 6's and delivers a steady, EVEN, 3-Volt current. It is square and compact. Weighs 40% less than two round No. 6's. Takes 30% less space. Requires two connections instead of four.
- Order the TWIN-SIX from Inland Equipment Co. Price is 39¢ each (47¢ west of Rockies); terms 5% 10 days, net 30. Orders for 30 or more shipped F. O. B. your Exchange.

BURGESS
TWIN-SIX
TELEPHONE BATTERY

INLAND EQUIPMENT CO., (Distributors)
MAX F. HOSEA, President, INDIANAPOLIS, IND.



"Controlled pointer action"... is the way sound engineers compliment the unvarying response of Weston DB indicators. Skillful engineering, and years of experience in the manufacture of DB meters, accounts for this uniformity. Also, it explains the widespread use of Weston DB indicators by communication engineers, companies manufacturing monitoring control, and amateur broadcasters . . . *everywhere*. The line consists of three types . . . High Speed — Low Speed — and General Purpose . . . to meet all requirements. Full details available in bulletin form . . . Weston Electrical Instrument Corporation, 576 Frelinghuysen Ave., Newark, New Jersey.

WESTON *Instruments*

ceptional character and ability and his understanding of human nature made him a valuable asset to the company.

Mr. Meals spent his entire life in the vicinity of Kittanning and was one of the best known men in the business and public life of Armstrong county, of which Kittanning is the county seat. At the time of his death he was also general manager of the Kittanning Limestone Co. He was a member of the First Methodist Church of Kittanning, a Mason and an Elk.

He served as county commissioner for two terms and was at one time engaged in agricultural and coal mining projects. He took an active interest in the Kittanning Chamber of Commerce and the Kittanning Rotary Club.

Mr. Meals is survived by his wife, Cora Miller Meals; one daughter, Ida V., and one son, Charles G.

News From Here and There

Teleflash Sporting News by Voice, Now Available

Last week an advertisement in the New York Times announced that patrons of enterprising hotels, restaurants, taverns, clubs, etc., are enjoying "Teleflash" sporting news by voice—as it occurs. Teleflash is an organization which furnishes to such public institutions vivid, blow-by-blow accounts of prize fights; the second-by-second action of horse races; the play-by-play account of baseball and football games as well as intimate descriptions of tennis and golf matches and hockey and polo games, and other sporting events as they occur.

This new service is subscribed to by various merchants in an effort to promote public patronage, there being no charge to the visitors. The Teleflash organization has a network of leased wires which at the present time is serving New York, Boston and Philadelphia, as well as other points as far west as Cleveland, Ohio. It is expected that the service will be extended throughout the country. The telephone company furnishes the leased wires and other necessary equipment but has nothing to do with furnishing the service to the various restaurants, clubs and other subscribers.

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Newspaper Features New Telephone Building

The new local telephone exchange building of the Gulf States Telephone Co., in Commerce, Texas, in which "open house" was conducted on Saturday, August 10, was the subject of the feature story on the first page of the Commerce Daily Journal of August 11. The story of the celebration of the completion of the attractive, one-story structure of face brick, is accompanied by a photograph of the building as well as photographs of the company's president, Judge S. A. Lindsey; vice-president and treasurer, John W. Miller; general manager, Oscar Burton; assistant general managers, E. L. McKnight and S. J. Neel.

The newspaper also contains a full-page advertisement of the Gulf States Telephone Co. which states that "Faith in Commerce Prompted the Building of Our Modern, New Home." Accompanying the text of the advertisement are reproduced a photograph of the new building, a group photograph of the local operators as well as photographs of Local Manager Roi Cornish and Plant Man Neal Horn.

Messages of congratulation to the telephone company were contained in display advertisements of more than a dozen local busines concerns.

• • •

Addition for Middletown, N. Y. Exchange

Charles C. Chappell, president of the Orange County Telephone Co. announced recently that plans are under way for the erection of an addition to its exchange building on John street, Middletown, N. Y.

In announcing the decision to increase the company's exchange facilities, Mr. Chappell reported that an employe sales campaign, under way since the first of this year, has resulted in these gains in business: More than 200 main line telephones, 20 extensions, more than 150 handsets, seven extension bells, 60 extra listings and 20 regrades of service.

Since 1913 when the present Middletown exchange building was erected, the company has gained 164 per cent more telephones and 555 per cent in toll business. At the peak of its development, May, 1932, the company had 5,600 telephones in service. By November, 1933, that figure had shrunk to 5,340, but from that time down to the present the total number of stations has gained slowly but steadily.

Activities of Commissions and Courts

Doctor Protests Limited Service at Orchard, Neb.

The Nebraska State Railway Commission has been asked to umpire a dispute between Dr. D. L. Fletcher of Orchard, Neb., and the managers of the Nebraska Continental Telephone Co. The doctor charges that the company gives limited service at that exchange, whereas at Page and Ewing, nearby towns, it offers 24-hour service. The same rate schedule applies to all three towns. He asked two other towns, Brunswick and Royal, to join with him in the demand.

An investigation by the commission developed that the Walnut Grove Telephone Co., of Walnut, is serving several subscribers in Orchard, and the Nebraska Continental officers said that if these were canceled out and service taken from their company, they would be willing to give Orchard the 24-hour service asked for.

The doctor answered that he did not want to be the goat for the telephone company in inducing these subscribers to change service, and the company replied that as the doctor was active in bringing Walnut Grove service to town, he should not object to helping right a situation that he does not like.

• • •

Lower Rate Fails to Induce Predicted Subscriber 'Rush'

Officers of the Central Nebraska Telephone Co., which began last February an experiment suggested by Commissioner F. L. Bollen, of making a low emergency rate for six months on the theory that this would induce rural subscribers to return to taking service at its Maxwell and Brady exchanges, have asked and been granted an extension of the tryout for another six months.

The experiment so far has been unsatisfactory, there being no rush for service demands by farmers as the commissioner had argued would follow. The manager writes the commission that while a few farmers returned, there was very little material profit to the company, but that while he believes the idea won't work, he is willing to try it for another half year to setttle the point beyond all dispute. The reduction was 25 cents a month on an already low rate.

• • •

Ouster Order Gives Company Year to Vacate

The recent order of the Missouri Supreme Court in the case of the State of Missouri ex. rel City of Lebanon vs. Missouri Standard Telephone Co.—directing that a writ of ouster issue in view of the fact that the company's franchise had expired in 1932 and it had refused to accept a new franchise on the basis of the payment of $20,000 to the city for a ten-year period—provides that the company be granted a period of one year in which to dispose of its property or remove its poles and wires or other equipment from the streets.

The order provides, further, that

International Products represent a treating service based on 60 years of experience plus a broad technical knowledge, unexcelled plant facilities and a policy of producing only high quality creosoted pine poles that last longest and cost least in service.

SOUTHERN PINE POLES

Long life is assured because only sound poles, seasoned under chemical control are treated. Framed to specifications they are ready for the hole upon arrival. International poles have been in service 35 years. That's proof they give the biggest dollar's worth.

SOUTHERN PINE POLES

International
CREOSOTING & CONSTRUCTION CO.
Producers of High Grade Creosoted Pine Poles
GALVESTON BEAUMONT TEXARKANA

"Telephony's" Engineering Data

By B. C. Burden

Index, Pole Line Design.
August 24, 1935.
No. 7-A, Page 1.

Pole-Top Extension Fixtures

Most states require that telephone and electric light wires clear highways and private driveways by some specified distance. This requires, at points where drop wires cross the road, the use of poles from five to ten feet higher than those used in the ordinary lead. When a lead is newly-constructed, it is an easy matter to spot poles of adequate height at locations where drop wires must cross roadways. In connection with existing leads where service requirements which necessitate road crossings develop after a lead is in place, existing poles are often of inadequate height and must be replaced with higher poles in order to accommodate even a single drop. In such instances a pole-line fixture which can be used to advantage and with considerable economy is that known as a "pole-top extension fixture."

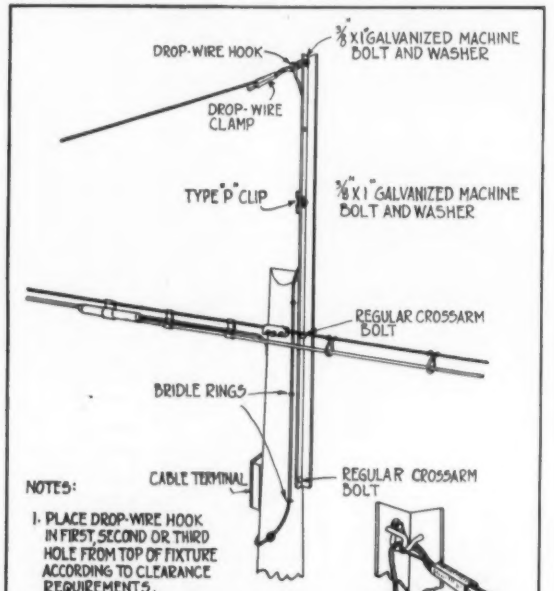
DROP-WIRE HOOK
⅜"X1" GALVANIZED MACHINE BOLT AND WASHER
DROP-WIRE CLAMP
TYPE "P" CLIP
⅜"X1" GALVANIZED MACHINE BOLT AND WASHER
REGULAR CROSSARM BOLT
BRIDLE RINGS
CABLE TERMINAL
REGULAR CROSSARM BOLT
NOTES:
1. PLACE DROP-WIRE HOOK IN FIRST, SECOND OR THIRD HOLE FROM TOP OF FIXTURE ACCORDING TO CLEARANCE REQUIREMENTS.
2. IF DIRECTION OF DROP PULL IS OPPOSITE FROM THAT SHOWN, REVERSE DROP-WIRE HOOK POSITION AS IN DETAIL.
DETAIL-(SEE NOTE 2)

FIG 1. POLE-TOP EXTENSION FIXTURE AS USED ON CABLE TERMINAL POLES.

"Telephony's" Engineering Data

By B. C. Burden

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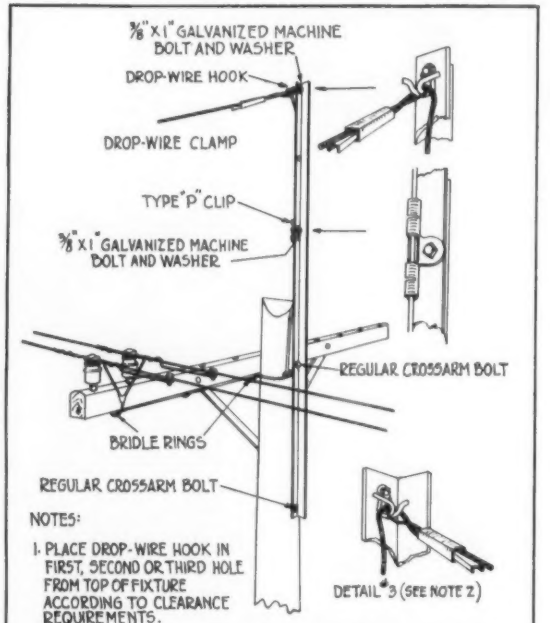
⅜"X1" GALVANIZED MACHINE BOLT AND WASHER
DROP-WIRE HOOK
DROP-WIRE CLAMP
TYPE "P" CLIP
⅜"X1" GALVANIZED MACHINE BOLT AND WASHER
REGULAR CROSSARM BOLT
BRIDLE RINGS
REGULAR CROSSARM BOLT
NOTES:
1. PLACE DROP-WIRE HOOK IN FIRST, SECOND OR THIRD HOLE FROM TOP OF FIXTURE ACCORDING TO CLEARANCE REQUIREMENTS.
DETAIL "3 (SEE NOTE 2)
2. IF DIRECTION OF DROP PULL IS OPPOSITE FROM THAT SHOWN, REVERSE DROP-WIRE HOOK POSITION AS IN DETAIL "3.
3. TWO-WIRE MAIN LINES CAN BE PLACED ON EXTENSION FIXTURE USING TWO-PIN CROSSARM AND ½" THROUGH BOLT.

FIG. 2. POLE-TOP EXTENSION FIXTURE AS USED ON OPEN-WIRE LEADS.

The pole-top extension fixture consists of a relatively light galvanized steel angle, 72 inches long, which is bolted to the top of the pole and which provides an extension to which the drop wire may be attached to provide greater clearance than would be provided by attaching the drop wire to the top of the pole. Fig. 1 illustrates the use of such a fixture in connection with a cable terminal pole.

The angle iron is drilled so as to permit bolting in the regular bolt holes provided in most poles which are factory-gained and so mounted that approximately 3½ feet of added pole height is obtained. The drop wire is extended up the side of the pole, attached to the angle iron by means of a special type of clamp now used in drop wire work, and a

"Telephony's" Engineering Data

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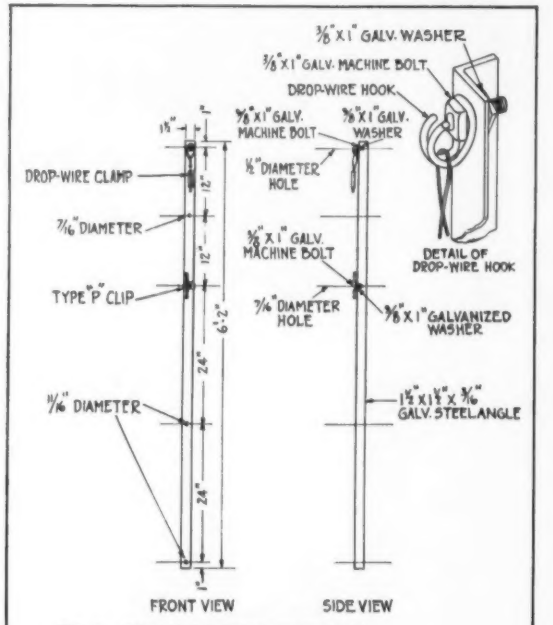

FIG. 3. POLE-TOP EXTENSION FIXTURE.

drop wire hook is bolted to the extreme top of the angle iron for the takeoff. Where exchanges use knobs and ties rather than drop wire clamps, the knobs can be bolted to the top of the angle iron.

Fig. 2 illustrates the use of the pole top extension fixture with open-wire leads.

At the time this data sheet was prepared, the hardware catalogs of the telephone suppliers did not list a regular pole-top extension fixture. One was designed using a vertical crossarm brace such as are used for bracing a four-crossarm lead. Such braces are well adapted for pole-top extension fixture use by drilling out two of the 7/16th-inch diameter holes to 11/16ths inch as shown in Fig. 3.

A recently-published catalog of one of the popular supply houses lists a special pole-top extension fixture, ready drilled for the purpose for which it is designed. The use of this fixture is recommended, for it is no more costly than the standard vertical brace, which would require modification to adapt it to pole-top extension fixture use.

leave is granted either party to move the court, within that period, to modify the order by either decreasing or increasing the period of time fixed for the removal of the company's property. The court reserves jurisdiction to entertain and act upon any motion filed herein within the period mentioned and thereafter to make such order or orders as it may deem proper or appropriate in the premises.

The ruling holds that the court may take judicial notice of the fact that *at this time the use of the telephone is a practical necessity essential to the safety, comfort, convenience, and social and economic welfare of all people.* Although a new 10-year franchise to operate a telephone system in the city of Lebanon had been granted by the city, on November 6, 1933, to a group of citizens, no steps had been taken—up to the time of the issue of the supreme court ruling—to install a telephone system under the terms of the franchise. The court found, therefore, that if it should direct the immediate removal of the company's poles and wires, *it would leave the people of Lebanon without the means of telephonic communication and would inflict upon them, as well as upon all others who wish to communicate with them, a most serious injury.*

• • •

New York Commission Consents to Stock Transfer

The New York Public Service Commission has given consent to the taking of all the outstanding capital stock of Upstate Telephone Corp. of New York, Johnstown, by William J. Wardall as trustee of the estate of Associated Telephone Utilities Co.

The Upstate Telephone Corp. was formerly called the Glen Telephone Co. into which was recently merged the former Black River Telephone Co., North Creek & Chestertown Telephone Corp. and Walker Telephone Co., Inc. The Upstate corporation operates about 19,000 stations in the territory formerly served by these companies in the central and northern part of upstate New York.

The stock to be transferred consists of 9,450 shares of common stock with $100 par value which is to be acquired and held by General Telephone Corp. which was organized under laws of New York state to acquire the assets of the Associated Telephone Utilities Co. pursuant to a plan in a proceeding now pending in federal district court for the reorganization of Associated Telephone Utilities Co. under the bankruptcy act; such taking to be subject to confirmation by the court.

The taking and holding of the capital stock of Upstate Telephone Corp. consented to is directed to 8,516 shares recorded in the name of S. L. Odegard, deceased, and to 934 shares recorded in the name of Associated Telephone Utilities Co.

A petition of the trustee of the estate of Associated Telephone Utilities Co. to acquire the stock of the Upstate company was recently denied, largely because the proposal was objected to in the means by which the Upstate corporation stock was acquired and held, in the inability of the trustee or the proposed successor corporation to satisfy the requirement of statute that the proposal is in the public interest, and because the proposed corporation was a foreign corporation over which the commission had little jurisdiction.

The approval now given is on a supplemental petition on the basis of which the case was reopened to receive additional evidence relating to the objections previously raised. The proposal now approved contemplates the ultimate acquisition of the Upstate company stock by General Telephone Corp. which was organized under the laws of the state of New York and meets the principal objection to the former application.

• • •

Seeks Permission to Issue $10,000 of Stock

The Chester Telephone Co. has applied to the Nebraska State Railway Commission for authority to issue $10,000 of stock. The company recently incorporated for $25,000, and the application sets out that the proceeds of the stock issue are to be used to purchase the exchange at Chester.

The company has been operated for a number of years by I. C. Steele of Ohiowa. Its original charter was for 25 years, and this expired some time ago by limitation of law. Mr. Steele owned all of the stock in the original corporations. He now desires to reincorporate. He will hold the majority control in the new company.

• • •

New England Bell Gets Legal Bill of Health

The New England Telephone & Telegraph Co., a corporation organized in the state of New York, is doing business legally in Massachusetts, according to an opinion filed recently with the Massachusetts Department of Public Utilities by Attorney-General Paul A. Dever.

In the late rate case before the commission and at recent legislative hearings, Wyckliffe C. Marshall, counsel for the Boston Central Labor Union, had contended that the N. E. Telephone & Telegraph Co. (of New York) was operating in the state without legal sanction, and that its right to issue additional capital when needed would be put under the jurisdiction of the Massachusetts commission.

There's no proving ground like actual experience. And that's where Hemingray Insulators—made of improved, tougher glass—demonstrate the ability to pass all of nature's tests as they come . . . heat . . . cold . . . storm . . . age. Hemingray Insulators are unaffected by seasonal or sudden temperature changes. They are homogeneous in character with only one coefficient of expansion. Write us about your requirements.
OWENS-ILLINOIS GLASS COMPANY, HEMINGRAY DIVISION, Muncie, Ind.

Ok
FOR LONG LIFE
OWENS-ILLINOIS
HEMINGRAY
PIN TYPE GLASS
INSULATORS

FIG4: POLE-TOP EXTENSION FIXTURE AS USED ON CABLE TERMINAL POLES.

Attorney-General Dever stated that there is nothing in the Massachusetts statutes that prohibits a foreign company from doing interstate business in the state, and that it is not unlawful for such a corporation to engage in intrastate telephone and telegraph business within the commonwealth. He stated that he could see no reason why a foreign corporation has not the same right to make permissive use of a location granted to a domestic corporation as foreign corporation engaged in interstate commerce.

"I am, therefore, of the opinion," said the communication, "that the carrying on of intrastate business together with an interstate business by a foreign corporation over locations granted to domestic companies constitutes no violation of sec. 39, chap. 159 of the revised laws."

• • •

Nebraska's Workmen Compensation Court

Nebraska's workmen compensation court, created by a law passed at the last session of the legislature, has been organized and began sittings July 1, with Frank M. Coffey, Lincoln, Neb., labor attorney, as presiding judge. Other members are Lawrence Welch of Omaha and Charles E. Jackman of Grand Island. Each is supposed to represent the three parties at interest in such controversies. Changes in the law were not very numerous. Appeals to the district court are open only to employer and employe, and not to insurance companies.

The law cuts from 350 to 325 weeks the maximum number of weeks for which death benefits may be received; requires insurance companies to pay 2 per cent of their compensation premiums and employers who elect not to carry insurance a like amount for the support of the court; changes maximum total disability benefits from $12 to $10 a week, and provides that in case of an injury which by itself causes only permanent partial disability, but combined with previous disability causes permanent total disability, employer is liable only for permanent total disability caused by the subsequent injury.

The court has issued a ruling that lump sum settlements will not be approved in the future unless full disclosure is made as to the person receiving the money, the object being to prevent excessive attorney fees being charged.

• • •

Residence Rate Lowered in Drive for New Business

The Nebraska State Railway Commission has issued an order permitting the new management of the Cozad Mutual Telephone Co. to make a drive for new business and to secure the return of lost subscribers by lowering its rates on residence service. The new schedule calls for $4.75 for business, $2.25 for individual party residence and $2 for two-party residence.

The new schedule, which expires July 1, 1936, at which time the old schedule goes into effect, also contains a provision providing for a uniform discount rate of 25 cents a month for all subscribers except rural patrons. The commission says that no hearing was necessary as the emergency schedule carries substantial reductions in cost of service to residence patrons. The company was found also to have complied with a requirement that the rate schedule could become effective only when the service had all been placed upon a common battery service.

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Commission Rulings and Schedule of Hearings

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D. C.

August 5: The Chesapeake & Potomac Telephone Co. of Virginia filed telephone tariff, revised pages to FCC No. 2, effective August 10. The revised pages, announcing the initial period station-to-station day toll rates from Narrows and Shumate, Va., to Meadow Bridge, W. Va., change the rates now in effect between these points on less than the required 30 days' notice. Therefore, they were rejected by the commission as being unlawful.

August 5: The Chesapeake & Potomac Telephone Co. of West Virginia filed telephone tariff, revised pages to FCC No. 2, effective August 10. The revised pages, announcing the initial period station-to-station day toll rates from Meadow Bridge, W. Va., to Narrows and Shumate, Va., change the rates now in effect between these points on less than 30 days' notice. Therefore, they were rejected by the commission as being unlawful.

August 10: The Pacific Telephone & Telegraph Co. filed telephone tariff, revised pages to FCC No. 1. Announces that effective August 20, North Dome Kettleman No. 10, Calif., Reclamation, Rye Patch Dam, Nev., and Mengel, Ore., will be established as toll rate centers. Announces that effective August 21, Mapleton, Ore., Avery, Dragline and Van Scott, Wash., will be established as toll rate centers. Announces that effective September 16, Kuney Camp, Idaho, will be discontinued as a telephone toll rate center.

August 12: Chesapeake & Potomac Telephone Co. of West Virginia filed telephone tariff, revised pages to FCC No. 2, effective September 12. The rates now in effect from certain points in West Virginia to Offutt, River, Fullerton, Ky., and Glenwood, Ohio, will be cancelled. Rates have been published for service from Buffalo Creek, W. Va., a new rate center, to certain points in Kentucky and Ohio. The block designations for certain rate centers in West Virginia have been published.

August 12: Southwestern Bell Telephone Co. filed telephone tariff, revised pages to FCC No. 1. Announces that effective August 17, Page, Okla., Beck, Hickman and Gateway, Ark., will be established as telephone toll stations. Announces that effective September 12, Monmouth, Mont Ida, Kans., Bragg City and Rochester, Mo., Ambrose, Texas and Geronimo, Okla., will be discontinued as rate centers; that Helena, Mo., will be established as a rate center, and rates have been published for service from this point to points in Kansas.

August 12: The Pacific Telephone & Telegraph Co. filed telephone tariff, revised pages to FCC No. 1, effective August 20. Announces that Bertram Kettleman, Calif., will be established as a telephone toll rate center.

August 13: American Telephone & Telegraph Co. filed telephone tariff, effective September 12. Revised pages to the toll rate and route guide have been filed for the purpose of revising station listings in Oklahoma, Michigan, Missouri, Oregon, Washington and Wyoming.

August 13: The Pacific Telephone & Telegraph Co. filed telephone tariff, revised pages to FCC No. 1, effective August 23. Announces that Twanoh Camp Park SP-18, Wash., will be established as a telephone toll rate center.

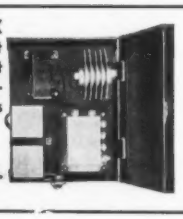
August 13: Wisconsin Telephone Co. filed telephone tariff, revised pages to FCC No. 1, effective August 17. Announces that the name of the rate cen-

(*Concluded on page* 38)

JOHN M. COOK
TELEPHONE ENGINEER
APPRAISALS RATE STUDIES
Determination of Exchange Costs Incident to the Furnishing of Toll Service.
Five Ivy St. Bldg. ATLANTA, GA.

ACCOUNTING
HERDRICH AND BOGGS
Certified Public Accountants
Specializing in Telephone Accounting and Rate Cases Since 1918
901-7 Continental Bank Bldg.
Indianapolis, Indiana

NOW—ELECTROX Current Supply Unit for operator's sets at a new low price — $14.85. No batteries needed.
Sent on Trial
Schauer Machine Co.
Cincinnati, Ohio



Buyer's Weekly Guide

A list of firms and companies offering equipment, supplies or services for operating telephone companies

ADDING MACHINES

Burroughs Adding Machine Company, Second Blvd., Detroit, Mich. — Adding, Bookkeeping, Calculating, Billing and Accounting Machines, Electric Carriage Typewriters, Standard Typewriters, Operator Correct-Posture Chairs. Burroughs machines are in use today in hundreds of progressive telephone companies throughout the country.

BATTERIES—DRY CELLS

Burgess Battery Co., Freeport, Ill.—Burgess Flashlights and Uni-Cel Flashlight Batteries—for dependability and service. The Burgess Twin-Six Telephone Battery—a 3-volt unit designed to replace two No. 6 cells, with longer life, lighter weight, smaller size and a leakproof case. The Burgess Little-Six—replaces the old type No. 6 cell, is smaller and lighter, will not ooze or bulge, has all the electrical capacity of the standard No. 6 cell.

National Carbon Company, 30 E. 42nd St., New York.—"Columbia" Telephone Dry Batteries; "Eveready" Flashlights, Flashlight Batteries and Long Life Dry Cells, "National Pyramid" brushes, carbon, graphite and metal graphite for motors, generators and rotary converters. "Eveready" Prestone anti-freeze; "Eveready" Rustone rust preventive; and "Eveready" Air Cell telephone operators' transmitter batteries.

Ray-O-Vac Company, Madison, Wis.—Ray-O-Vac telephone batteries — longer life and better service proven by tests in accordance with U. S. Government standards and records of users. Ray-O-Vac flashlights and industrial flashlight batteries are other items showing Ray-O-Vac's outstanding quality.

BATTERIES—STORAGE

The Electric Storage Battery Company, Allegheny Ave. and 19th St., Philadelphia, Pa.—Exide Storage Batteries. Branches: Boston, New York, Rochester, Philadelphia, Pittsburgh, Washington, Atlanta, Cincinnati, Cleveland, Detroit, Chicago, Kansas City, Minneapolis, St. Louis, Denver, San Francisco and Seattle.

BATTERY CHARGING EQUIPMENT

General Electric Company, Bridgeport, Conn.—Tungar battery chargers. G-E pole line hardware. Cable filling compound.

CABLE—LEAD ENCASED

American Electrical Works, Phillipsdale, R. I.—Paper telephone cable, switchboard cable, bare copper wire. Chicago Office: 20 N. Wacker Drive; Cincinnati: Traction Bldg.; New York: 100 E. 42nd St.

British Insulated Cables, Ltd., Surrey House, Embankment, W. C. 2, Factory: Prescot, Lancashire, England.—Telephone cable of all sizes and capacities.

General Cable Corporation, 420 Lexington Ave., New York, N. Y.—Paper telephone cables of standardized manufacture for over forty years. Weatherproof and insulated copperweld drop wire.

Eugene F. Phillips Electrical Works, Ltd., Montreal, Can.—For any type of wire or cable used in telephone, telegraph or power work get in touch with "Phillips." Manufacturers of bare and insulated copper wires, rubber insulated wires, enameled wire, magnet wire, telephone cables, power cables, switchboard cables, flexible cords, copper rods, etc.

CABLE RINGS

National Telephone Supply Company, 5100 Superior Ave., Cleveland, Ohio.—National Cable Rings, National Splicing Sleeves, Non-Breakable Messenger Cable Hangers, Marlin and Swisher Cable Hangers and Custom Galvanizers. National cable rings are practical because they are two-way,—they allow the cable to be pulled in either direction. National sleeves make secure the weakest points in the line. If it's a splice—make it a National.

CABLE TERMINALS

Cook Electric Company, 2700 Southport Ave., Chicago, Ill.—Protective Pole Cable Terminals, Unprotected Pole Cable Terminals, central office protection, lighting arresters, sleeves, fuses.

Reliable Electric Company, 3145 Carroll Ave., Chicago, Ill.—Complete line of cable terminals, telephone and switchboard protectors, sleeves, fuses, solderless wire connectors and specialties.

CARBON DIAPHRAGMS

Noris Carbon Company, Inc., 160 5th Ave., New York, N. Y.—Carbon diaphragms, carbon back plates, granular and globular carbons, lightning arresters.

CONDUIT

Brazil Hollow Brick & Tile Company, Brazil, Ind.—Makers of Brazil Vitrified Tile Conduit.

CORDS, CABLE AND WIRE

Lenz Electric Manufacturing Co., 1751 N. Western Ave., Chicago—Established 1904—telephone and switchboard cords for all makes of equipment, braided and lead-covered telephone cable, flame-proof jumper wire, interior telephone wire, switchboard wire.

CORDS AND WIRE

Runzel Cord & Wire Co., 4727-31 Montrose Ave., Chicago—Telephone and Switchboard Cords, Flame-proof Jumper Wire, Switchboard Wire, Interior Telephone Wire. W. L. Runzel, President, has devoted over 40 years to the making of fine telephone cords.

ELAPSED TIME RECORDERS

Calculagraph Company, 50 Church St., New York, N. Y.—Calculagraph is the world's standard elapsed time recorder and gives you toll records printed with elapsed time to the second. Both spring driven and electric motor models are available.

POLES

B. J. Carney & Co., 100 N. 7th St., Minneapolis, Minn.—Western red cedar poles. Pentrex Butt Treated or Plain.

Alfred E. Cowling, Scotstown, Quebec.—Eastern cedar poles, plain or butt treated.

International Creosoting and Construction Company, Galveston, Texas—Creosoted Southern Yellow Pine Poles. Plants: Beaumont and Texarkana, Texas.

Jordan Bros. Lumber Co., Box 84, Norfolk, Va.—Virginia White Cedar Poles. Plain or charred and creo-treated butts.

MacGillis & Gibbs Company, Milwaukee, Wis.—Northern White and Western Red Cedar Poles. Plain or butt-treated. Immediate quotations on request.

Michigan Pole & Tie Company, Newberry and Grand Rapids, Mich. — "Poles with Character." Northern White and Western Red Cedar. Strategically located yards, Minneapolis, Minn., and Reed City (Lower Michigan), insure quick deliveries.

Naugle Pole & Tie Co., 5 South Wabash Ave., Chicago, Ill. Northern White and Western Red Cedar Poles. Plain or butt-treated. Let us quote you our new low prices.

H. Sigalet & Company, Ltd., Lumby, B. C., Canada — Western Red Cedar Poles. Plain or Butt treated.

Valentine Clark Corporation, 2516 Doswell Ave., St. Paul, Minn.—Finished Cedar Poles. Plain or Butt treated.

SUPPLIES, SWITCHBOARDS AND INSTRUMENTS

American Automatic Electric Sales Company, 1033 West Van Buren Street, Chicago, Ill.—Public Automatic Telephone Systems, Private Automatic Telephone Systems, Central Battery and Magneto Manual Telephone Switchboards, Remote Control Switchboards, Telephone Instruments of all types, Battery Eliminators, Charging Equipment, Signaling and Control Apparatus, Cords, Wires, Cables, Monotype Copperweld Drop Wire, and a complete line of construction materials and supplies.

Automatic Electric Company, 1033 W. Van Buren St., Chicago, Ill.—Public Automatic Dial Systems, Private Automatic Dial Systems, Telephones, relays, signaling and control equipment.

Automatic Electric Company, Ltd., Milton Road, Edge Lane, Liverpool, England. —Automatic Telephone Equipment.

Automatic Electric Sales Company, Ltd., 1027 W. Van Buren St., Chicago, Ill.—Public Automatic Dial Systems, Private Automatic Dial Systems, Manual Telephone Equipment, telephones, storage batteries, wire, cable, poles, etc.

Kellogg Switchboard & Supply Company, Adams & Aberdeen Sts., Chicago, Ill.—Engineers and designers, manufacturers and suppliers of complete equipment for telephone exchanges and communication systems. Manufacturers of "Master-built" Common Battery, Magneto and PBX Switchboards, "Masterphone" Telephone Instruments, and a complete line of telephone supplies, including bronze drop and interior wire.

North Electric Manufacturing Company, Galion, Ohio—Machine switching telephone systems. Automanual and Automatic. "All-Relay" Switching Apparatus (Dialless and Dial Control). Unattended Satellite Systems.

Siemens Brothers & Company, Ltd., Woolwich, England—Automatic and Manual Telephone Equipment.

Stromberg-Carlson Telephone Manufacturing Company, 100 Carlson Road, Rochester, N. Y. — Telephone apparatus of all kinds, switchboard cords, cable and general telephone supplies.

TOOLS

Crescent Tool Co., Jamestown, N. Y.—CRESTOLOY Pliers, Curved Needle Nose Pliers, Heavy Diagonal Cutting Pliers, Linemen's Side Cutting Pliers, End Cutting Nippers, Crescent Hack Saws.

CLASSIFIED SECTION

Rates 10 cents per word payable in advance. Minimum charge $2.00 for 20 words or less.

SUCCESSFUL TELEPHONE SELLING

The problem of how to make sales by telephone, which has been confronting business executives for years, has at last been solved. Frank Dalton O'Sullivan, with the help and advice of telephone company executives, has just completed a practical Course in Telephone Salesmanship, which thoroughly prepares telephone sales operators for their work. 50,000 words — 24 lessons — self-answered questions. Regular price, $24, BUT special price to telephone companies and business houses answering this advertisement, $12. Sell it to business subscribers at cost or at a profit to your company. Satisfaction guaranteed, or money back. Descriptive circular on request.

THE LITERARY WORKSHOP
35 W. Jackson Blvd. Chicago, Ill.

FOR SALE

FOR SALE—Control and Management—High peak, five hundred stations, Indiana. Exceptional proposition for practical telephone man. Substantial payment required. No trades. Address 8470, care TELEPHONY.

FOR SALE—Cross arm braces, locust pins, transposition brackets, one point iron insulated pins with wooden caps, carriage bolts. Low prices for quick sale. American Iron & Metal Co., Marietta, O.

NEED TOLL TICKETS?
Write: Specialty Printers,
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MOTOR GENERATOR SET

MOTOR
220-Volt, 3-Phase, 10-H.P.

GENERATOR
33-Volt, 175-Ampere

STARTING COMPENSATOR

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Absolutely finest workmanship guaranteed

Baked, black, velvet finish, New granular carbon. Workmanship, adjustments and tests made with the latest and most improved apparatus. 50c each less backs. The finest workmanship guaranteed.

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→ THIS WEEK'S SPECIAL ←
Rebuilt Like New
W. E. No. 14 Unprotected 16-Pair Cable Terminals. Without stub, $2.75.
With 6-foot stub from top or bottom, $4.75.
Baird—Single-slot pay stations for wall phones—5-10-25 coins—$5.00.

Telephone Repair Shop
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FOR SALE

Locate cable trouble with the **CANTY FAULT FINDER.** This new cable tester operates on two dry cells and locates all cable faults (except opens). There are two binding posts for lead wires to bad cable pairs. Adjustment of tone is simple,—move lock nut up or down. Size 3"x4"x7". No telephone exchange should be without the **CANTY FAULT FINDER.** Price $12.50 postpaid complete, less head set. Address 8101, care of TELEPHONY.

POSITIONS WANTED

POSITION WANTED—Traffic or commercial, thoroughly familiar with latest engineering and operating methods. Dial or manual; single or multi-office; force adjustment and management. Address 8468, care of TELEPHONY.

ENGINEER and plant superintendent, eleven years Bell and Independent experience, university graduate, age 33, capable of handling plant and personnel problems in practical and progressive manner, desires position with greater opportunity for advancement. Address No. 8465, care of TELEPHONY.

(*Concluded from page* 36)

ter, Sister Bay, Wis., has been changed to Sister Bay toll station.

MINNESOTA

August 12: Approval granted the application of the Nicollet County Telephone & Telegraph Co. to consolidate its Kasota exchange area with the St. Peter exchange area, and to render service from the central office in St. Peter.

NEBRASKA

August 4: Application filed by Dundy County Mutual Telephone Co. for authority to waive collection of installation charges for the months of August and September.

August 6: Informal complaint filed by J. P. Kelly for Broadwater Chamber of Commerce charging that rates charged at the Broadwater exchange by the Platte Valley Telephone Corp. are excessive, and asking relief; advised to file formal complaint if hearing is desired.

August 10: Informal complaint filed by C. E. Thorp, secretary of Tilden Chamber of Commerce, alleging that the Nebraska Continental Telephone Co. has discontinued free service to Meadow Grove and Shell Creek company subscribers and asking that it be ordered restored; advised that commission has no power to force service to be given without proper compensation; company charges 10-cent toll.

August 10: Informal complaint filed by Dr. D. L. Fletcher asking that subscribers at Orchard exchange of the Nebraska Continental Telephone Co. be given 24-hour service, the same as at Page and Ewing in the same section of the state.

August 12: In the matter of the application of the Central Nebraska Telephone Co. for authority to continue in force another six months present low emergency farm rate schedule; found reasonable and granted. Order is to expire automatically February 1, 1936.

August 12: In the matter of the application of the Cozad Mutual Telephone Co. for authority to establish emergency residence rates; found reasonable, that the company has fully complied with requirements as to change to common battery service, and order issued that rates be in force and collectible until July 1, 1936, when the company will be at liberty to restore schedule previously approved.

OHIO

August 13: Complaint filed by Albert Titmas, public accountant of 523 Ohio building, Akron, against the Ohio Bell Telephone Co., attacking the alleged discriminatory rental of $4.75 which he alleges the defendant is now charging him for a 2-party line service. He compares this rental charge with that of $3.75 charged for similar service at 242 Madison avenue and other locations in that city.

The defendant company was given 15 days by the commission in which to file an answer.

August 13: Petition filed by the Cavett Telephone Co., operating in Van Wert county, asking for permission to abandon its service. The petition sets forth that whereas it had 200 subscribers when the business was started more than 30 years ago, it now has only 29 subscribers.

The company contends that the public will not be inconvenienced by discontinuing its service as other telephone accommodations are available in that territory.